590108-0605170001

CH2M HILL Mound, Inc.
1075 Mound Road
P.O. Box 750
Miamisburg, OH 45343-0750

CH2MHILL

SMO-307/06
May 11, 2006

Mr. Don Pfister, Director
Miamisburg Closure Project
U. S. Department of Energy
175 Tri-County Parkway
Springdale, OH 45246

ATTENTION: Paul Lucas

SUBJECT: **Contract No. DE-AC24-03OH20152:** Deliverable #36 Building Data Package; Section C.2.1.1 Facility Demolition; Deliverable #39 Potential release site and removal action documentation; Section C.2.3.1.3 Remaining Response Actions; UGL Partial VI OSC Report, Final

Dear Mr. Pfister:

Attached is the following Final document for your records. The response to comments was sent by email on April 10, 2006.

- UGL Partial VI OSC Report, Final

If you or members of your staff have any questions regarding the document, or if additional support is needed, please contact Dave Rakel at 937-865-4203.

Sincerely,

Michael D. Ebben
Site Manager

ME/jg

Enclosures

cc: T. Fischer, USEPA, (1) w/attachments
B. Nickel, OEPA, (1) w/attachments
S.Helmer, ODH, (1) w/attachments
J. Colleli, ODH, (1) w/attachments
M. Wojciechowski, Tetra Tech, (1) w/attach
G. Gorsuch, DOE/MCP, (1) w/attachments
R. Tormey, DOE/OH, (1) w/attachments
G. Desai, DOE/HQ, (1) w/attachments
C. Kline, CH2M Hill, (1) w/attachments
Public Reading Room (1) w/attachments
Admin Records, CH2M Hill, (2) w/attachs
ER Records, CH2M Hill, (1) w/attachs
DCC (1) w/attachments
M. Ebben, CH2M Hill, w/o attachments
K. Armstrong, CH2M Hill, w/o attachments
D. Rakel, CH2M Hill, w/o attachments
D. Kramer, CH2M Hill, w/o attachments
J. Fontaine, CH2M Hill, w/o attachments
S. Barr, CH2M Hill, w/o attachments
M. McDougal, CH2M Hill, w/o attachments
file, CH2M Hill, w/o attachments

UGL PARTIAL VI
REMOVAL ACTION
OSC REPORT

This Report Closes AGL/OHL & Compound

April 2006

Final

Department of Energy
Miamisburg Closure Project

CH2MHILL

K:\SHARED\ER\All UGLs\Partial VI AGL-OHL-Compound\OSC REPORT\AGL-OHL&Comp OSC Final.doc
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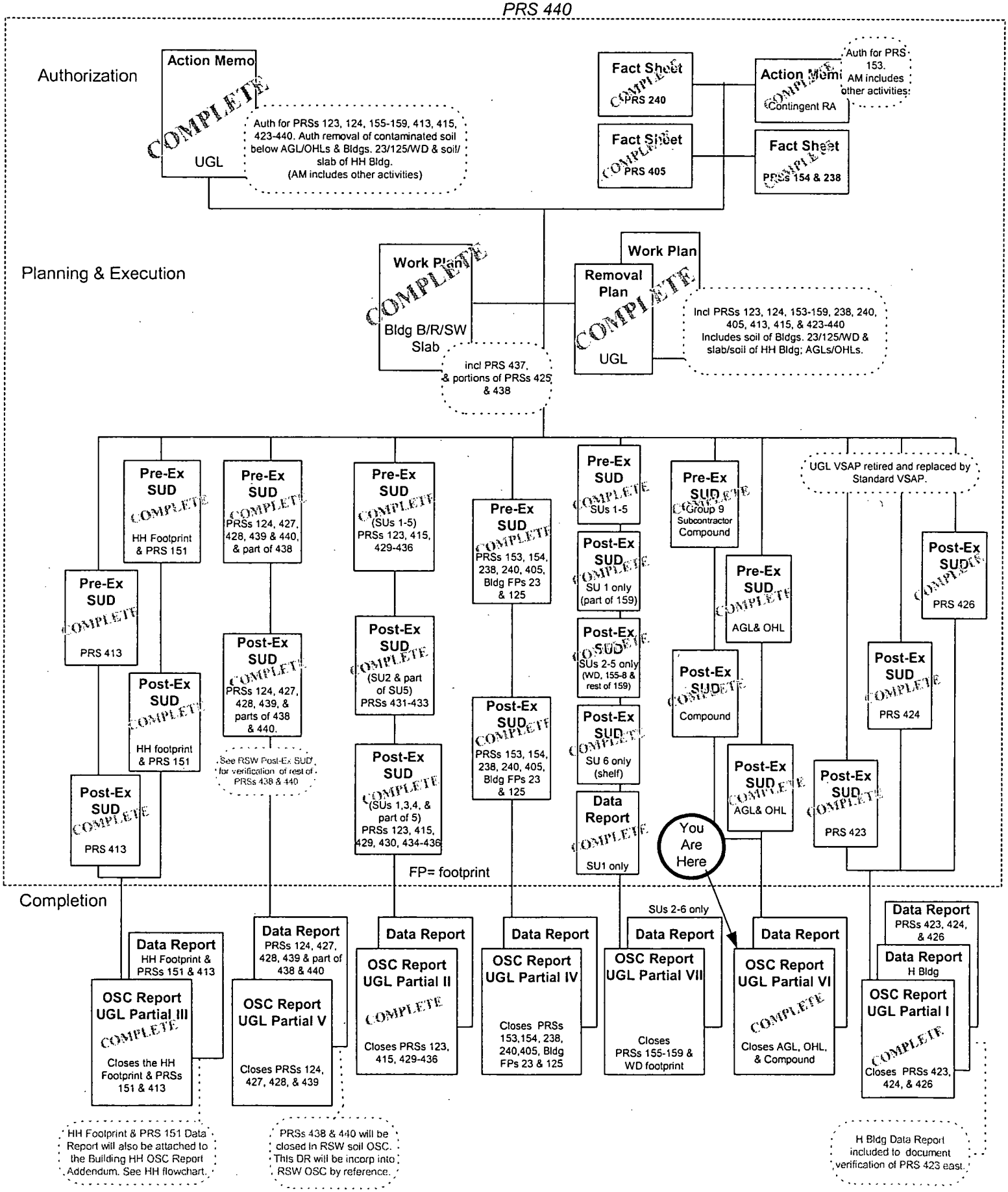
UGL (Underground Waste Transfer Lines) (AKA Group 9):

PRSs 123, 124, 153-159, 238, 240, 405, 413, 415, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439 & 440

Includes soil below AGL/OHL & Bldgs 23, 125, HH, & WD. Includes work planning and verification for PRS 440



11Apr06 kma

TABLE OF CONTENTS

Section		Page
RECOMMENDATION		iii
1.0	SUMMARY OF EVENTS	1
1.1	Site Conditions and Background	1
1.2	Organization of the Removal Actions	3
1.3	Objectives	3
1.4	Chronological Narrative of the Removal Actions	4
2.0	EFFECTIVENESS OF THE REMOVAL ACTIONS	5
2.1	Actions Taken by Mound Personnel	5
2.2	Actions Taken by Local, State, and Federal Agencies	5
2.3	Actions Taken by Subcontractors	5
3.0	DIFFICULTIES ENCOUNTERED	5
3.1	Items that Affect the Removal Actions	5
3.2	Issues of Intergovernmental Coordination	6
4.0	RECOMMENDATIONS	6
4.1	Means to Prevent a Recurrence	6

Tables

Table 1:	Organization of the Removal Action	2
Table 2:	Cleanup Criteria	4
Table 3:	Chronology of RA	5

Attachments

Attachment A	Data Report
Attachment B	General Media Information

Acronyms

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CO	cleanup objective
COC	contaminant of concern
CRA	Contingent Removal Action
cy	cubic yards
DOE	Department of Energy
HS	hot spot
MCP	Miamisburg Closure Project
mg/kg	milligram per kilogram
OEPA	Ohio Environmental Protection Agency
OSC	On-Scene Coordinator
pCi/g	picoCuries per gram
ppm	parts per million
PRP	Potentially Responsible Parties
PRS	Potential Release Site
RA	Removal Action
RASS	Remedial Action Survey Sample
SUD	Survey Unit Design
UCL	upper confidence limit
UGL	underground line
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
VSAP	Verification Sampling and Analysis Plan

RECOMMENDATION: AGL/OHL & COMPOUND

The Aboveground lines (AGLs)/Overhead Lines (OHLs) and the Subcontractor Compound Removal Actions (RAs), consisting of verification sampling only, were authorized via the Underground Line (UGL) Action Memo, Final, September 2003. The AGL/OHL and Subcontractor Compound RAs were based on historical and recent processes that could have the potential to result in contaminated soil. Both RAs were performed to confirm that the soil met the cleanup objectives.

Verification sampling was performed per the associated Action Memo, the UGLs Removal Plan, Final, April 2004, and the Standard VSAP Soils Verification Sampling & Analysis Plan [VSAP], Final, August 2004 to demonstrate that the soil meets the cleanup criteria. This removal action was successfully completed and resulted in no excavation.

The cleanup criteria established in the Standard VSAP are satisfied if all verification sample results are below cleanup objectives (COs) or all sample results are below hot spot (HS) criteria and the 95% UCL (upper confidence limit) for the area of interest is less than the CO and the data set passes the Sign test.

Following removal of the AGL/OHLs, verification sampling at AGL/OHL confirmed Ac-227, Am-241, Cs-137, Co-60, Pb-210, Pu-238, Ra-226, Th-230, Th-232, tritium, and gross beta were below COs. Verification sampling at the Compound confirmed Pu-238, Pu-239/240, and tritium were below COs. All results for AGL/OHL and Subcontractor Compound are below COs documenting that the cleanup criteria were met.

After a thorough review of this On-Scene Coordinator (OSC) Report, the Core Team agrees that the RAs associated with AGL/OHL and the Subcontractor Compound are complete, and that all previously existing environmental issues associated with them have been resolved.

Paul Lucas 5/4/06

Paul Lucas, OSC
U.S. Department of Energy
Springdale, Ohio

5/4/06

Timothy J. Fischer, Remedial Project Manager
USEPA
Chicago, Illinois

5/4/06

Brian Nickel, Project Manager
OEPA
Dayton, Ohio

1.0 SUMMARY OF EVENTS

This section describes the site background and events leading up to the removal action (RA), parties involved in responding to the RA, cleanup objective (CO) determination, chronological narrative of the RA, and resources committed to complete the projects.

1.1 Site Conditions and Background

Background. The Underground Line (UGL) RA addresses transfer lines (aboveground, underground, and overhead) used to connect sumps and process lines from within T, R, SW, and H Buildings to the WD process treatment facility for treatment of generated radiologically contaminated liquid and sediment waste. Multiple field efforts were performed, each addressing a portion of the overall UGL project. Multiple OSC Reports will be prepared, each closing out a portion of the overall UGL project.

The UGL RA also addresses the Subcontractor Compound (hereinafter referred to as "Compound") that was established to facilitate completion of the UGL project. During use of the Compound, low-level plutonium-238 contamination was transferred onto the surface of the Compound by foot and vehicle traffic. The contamination was quickly cleaned up and surveyed per Radiological Control Procedure MD-80036. The entire Compound surface was verified as part of the UGL RA to confirm that the soil meets COs.

Removal Action. This OSC Report documents completion of the Above Ground Line (AGL), Overhead Line (OHL), and Compound RAs; all of which were authorized by the UGL Action Memo, Removal Action of Soil & Underground Waste Transfer Lines Leading to WD Building, Final, September 2003. The potential for soil contamination warranted a RA under CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act). The location of the AGL/OHL and Compound are shown on Figure 1 (on page A8/61). The AGL/OHL lines were removed and disposed of prior to verification conducted under this RA. There are no Potential Release Sites (PRSs) closed via this OSC Report.

Verification sampling and analysis was performed in accordance with the UGLs Removal Plan, Final, April 2004; the Standard VSAP, Soils Verification Sampling & Analysis Plan [VSAP], Final, August 2004; and Post-Excavation (Ex) Survey Unit Designs (SUDs). Excerpts of the associated SUDs are included in Appendix C of Attachment A to this OSC Report. For AGL/OHL and Compound, verification sampling was performed and the results demonstrate that the soil meets the CO.

Since the Department of Energy (DOE) is the sole responsible party for verification of AGL/OHL and Compound, no Potentially Responsible Parties (PRPs) were sought to clean up the site. Monsanto Research Corporation, EG&G Mound Applied Technologies, and BWXT of Ohio, Inc were the operating contractors at the site from 1948 to 30 September 1988, from 1 October 1988 until 30 September 1997, and from 1 October 1997 until 31 December 2002 respectively. CH2M Hill Mound, Inc. became the site contractor for the Miamisburg Closure Project (MCP) effective January 1, 2003.

1.2 Organization of the Removal Actions

Table 1 lists the parties responding to the removal actions, and their responsibilities.

Table 1: Organization of the Removal Action

US Environmental Protection Agency (USEPA) SFR-5J 77 W. Jackson Street Chicago, IL 60604 312-353-2000	Timothy J. Fischer	Federal agency responsible for oversight
Ohio Environmental Protection Agency (OEPA) 401 E. Fifth Street Dayton, OH 45402-2911 937-285-6357	Brian K. Nickel	State agency responsible for oversight
US Dept. of Energy Miamisburg Closure Project 175 Tri-County Parkway Springdale, OH 45246 513-246-0071	Paul Lucas	On-scene Coordinator responsible for oversight and success
CH2M HILL Environmental Restoration Project 1075 Mound Road Miamisburg, OH 45343-3030 937-608-8220	Jim Fontaine	Provide OSC with technical assistance, administrative support, field oversight, sample management, site safety, photo, site documentation, and preparation of the OSC Report

1.3 Objectives

Documentation Objective. The objectives of this OSC Report are to describe the RA fieldwork and document successful completion of the project. Contaminated soil was not required to be removed as part of this project. Because this is a partial OSC Report, complete costs are not available to report. Total project cost for the UGL Removal Action will be reported in the last of the OSC Reports associated with the UGL Removal Action.

Cleanup Objective. Contaminants and COs/screening levels for the AGL/OHL and Compound are identified in Table 2.

Table 2: Soil Cleanup Objectives (pCi/g)

Contaminant	Cleanup Objective	Hot Spot	Location
Actinium-227 +D	4.6	13.61	AGL/OHL
Americium-241	63	189	AGL/OHL
Cobalt-60	0.7	2.1	AGL/OHL

Contaminant	Cleanup Objective	Hot Spot	Location
Cesium-137 +D	3.8	10.62	AGL/OHL
Gross beta	94.72 (assumes all activity is Sr-90)	na	AGL/OHL
Lead-210 +D	7.4	19.8	AGL/OHL
Plutonium-238	55	165	AGL/OHL & Compound
Plutonium 239/240	62	186	Compound
Radium-226 +D	2.9	4.7	AGL/OHL
Thorium-230 +D	2.8	4.6	AGL/OHL
Thorium-232 +D	2.1	3.5	AGL/OHL
Tritium	75 (screening level)	na	AGL/OHL & Compound

na: not available

The cleanup criteria are satisfied if all verification sample results are below CO or all sample results are below hot spot (HS) criteria and the 95% UCL (upper confidence limit) for the area of interest is less than the CO and the data set passes the Sign test.

Cleanup Objective. Verification results are identified in the Data Report (Attachment A to this OSC Report), Tables 1 and 2 (A16/61 and A20/61). There were no sample results that exceeded the CO for any analyte.

Hot Spot Criteria. The Hot Spot criteria for the contaminants are presented in Table 2 above. There were no sample results that exceeded the hot spot criteria for any analyte.

1.4 Chronological Narrative of the Removal Actions

Table 3 presents a chronological narrative of events surrounding the RAs.

Table 3: Chronology of RA

Timeframe	Activity
August 2003	UGL RA authorized.
April 2004	UGL Removal Plan approved.
June 2004- September 2005	Removal of AGLs and OHLs
July/August 2004	Cleanup of contamination event at Compound
November 2005	Verification sampling & analysis for Compound
January 2006	Verification sampling & analysis for AGL/OHL
March 2006	OSC Report prepared.

2.0 EFFECTIVENESS OF THE REMOVAL ACTIONS

The AGL/OHL and Compound removal actions are complete, and the objectives of the Action Memorandum have been met. The limits of verification are identified on Figures 2-7 (see A9/61 – A14/61). Results of verification sampling and analysis are provided in Attachment A.

2.1 Actions Taken by Mound Personnel

CH2M Hill Mound, Inc. personnel planned and performed removal action oversight, and performed monitoring, sampling and analyses, and documentation. The project met the removal action objectives (Section 1.3), as outlined in the Action Memorandum. CH2M Hill Mound, Inc. personnel prepared this OSC Report, which shows that the Removal Action objectives were achieved.

2.2 Actions Taken by Local, State, and Federal Agencies

The DOE/MCP was the lead agency for the RA and provided the funding. DOE, USEPA, and OEPA had oversight responsibility for the RA and review of the Action Memorandum and OSC Report to ensure that the objectives were met.

2.3 Actions Taken by Subcontractors

Subcontractors involved in the project included:

- Terran of Ohio - performed site soil sampling, data management, and validation.

3.0 DIFFICULTIES ENCOUNTERED

3.1 Items that Affect the Removal Actions

No difficulties were encountered during the removal actions.

3.2 Issues of Intergovernmental Coordination

All DOE/OEPA/USEPA interactions were good. The agencies were updated informally on a regular basis, and formally at monthly Core Team meetings. The Mound 2000 Process worked well.

4.0 RECOMMENDATIONS

4.1 Means to Prevent a Recurrence

Soil sampling verified that removal of soil was not required. The AGLs and OHLs were removed, and the subcontractor has demobilized from the site and removed equipment

from the Compound. Mound Removal Actions have regulator approved work plans, each of which has a section that addresses runon/runoff controls. In addition, the site Storm Water Pollution Prevention Plan applies to the entire site and is monitored by the Environmental Compliance and Analytical Services group. As a result of the removal of the facilities and operations that caused the potential for contamination, and runon/runoff protection, spread of contamination is prevented. After the removal action and the CERCLA process for the parcel are complete, the area will be transferred from Federal to private ownership. All State and Federal disposal rules will apply.

ATTACHMENT A

DATA REPORT

DATA REPORT

AGL/OHL & Compound

April 2006

Rev. 1

Department of Energy
Miamisburg Closure Project

CH2MHILL

A1/61

Table of Contents

Section		Page
1.0	PURPOSE	1
2.0	DOCUMENT ORGANIZATION / SUMMARY	1
3.0	FIELD ACTIVITIES	1
3.1	AGL/OHL	1
3.2	Compound	2
4.0	DATA REVIEW / VALIDATION	3

Figures

Figure 1: Location of AGL/OHL & Compound

Figure 2: AGL/OHL Sample Locations

Figure 3: Compound SUs 1-4

Figure 4: Compound SU1

Figure 5: Compound SU2

Figure 6: Compound SU3

Figure 7: Compound SU4

Tables

Table 1: AGL/OHL Verification Results

Table 2: Compound Verification Results

Table 3: AGL/OHL Standard Deviation Calculations

Table 4: Compound Standard Deviation Calculations

Table 5: AGL/OHL Recalculation of N

Table 6: AGL/OHL Power Curve

Table 7: Compound Recalculations of N

Table 8: Compound Power Curves

Table of Contents

(continued)

Appendices

Appendix A	Figures
Appendix B	Tables
Appendix C	Post-Ex SUD Excerpts
Appendix D	Backfill Packages
Appendix E	Data Review & Validation

Acronyms

AGL	above ground line
CO	cleanup objective
Ex	Excavation
OHL	overhead line
pCi/g	picoCuries per gram
QC	quality control
RASS	Remedial Action Site Survey
R&V	review and validation
SUD	Survey Unit Design
VSAP	Verification Sampling and Analysis Plan

1.0 PURPOSE

This Data Report provides documentation of sampling activities conducted in accordance with the Standard VSAP, Soils Verification Sampling & Analysis Plan [VSAP], Final, August 2004 and the Post-Ex (Excavation) Survey Unit Designs (SUDs); required to close out the above ground lines (AGLs), overhead lines (OHLs), and the Subcontractor Compound (hereinafter referred to as "Compound").

The purposes of this Data Report are to:

- document any variances to the VSAP/Post-Ex SUDs,
- present statistical and bias data (separately),
- present summary statistics and statistical analyses [as necessary] of the applicable data, including retrospective power curve, and
- provide documentation of data review and validation.

2.0 DOCUMENT ORGANIZATION / SUMMARY

This Data Report is for the AGLs/OHLs and the Compound, all of which are shown on Figure 1. Unless otherwise specified as a variance, sampling and analyses were conducted in accordance with the VSAP and Post-Ex SUDs. An excerpt of each Post-Ex SUD is presented in Appendix C.

3.0 FIELD ACTIVITIES

3.1 AGL/OHL

Per the Core Team-approved Post-Ex SUD, Remedial Action Site Survey (RASS) data collected in January 2006 were used as verification data. Using RASS data as verification data is acceptable because there were no historical data suggesting that the soil beneath the AGL/OHLs was contaminated, no leaks were known to have occurred from the lines, and the exterior of the lines were surveyed and found to be below release criteria. RASS results were all below cleanup objectives, which confirms that the soil beneath the lines was not contaminated. Sample locations are shown on Figure 2. Surface soil samples were collected in accordance with radiological control procedure MD 80036. Per the Post-Ex SUD, all samples received onsite long-count gamma spec analysis with ten percent of the samples being submitted for onsite tritium

and offsite gross beta analyses. An excerpt of the AGL/OHL Post-Ex SUD is included in Appendix C. Results are presented in Table 1. Statistical analyses (standard deviation, power curve, and recalculation of N) are presented in Tables 3, 5, and 6, respectively. A backfill package is not required because excavation did not occur.

3.2 COMPOUND

Verification sampling activities occurred in November 2005. Sample locations are shown on Figure 3. The investigation was conducted in accordance with the Standard VSAP, Soils Verification Sampling & Analysis Plan, Final, August 2004. Per the Subcontractor Compound Post-Ex SUD, all samples from SUs 1-4 were shipped offsite for isotopic plutonium analysis. SU4 also received offsite tritium analysis. An excerpt of the Post-Ex SUD is included in Appendix C. Results are presented in Table 2. Statistical analyses (standard deviation, power curves, and recalculations of N) are presented in Tables 4, 7, and 8, respectively. A backfill package is not required because excavation did not occur.

Surface soil samples were collected in accordance with the procedures presented in the Mound Methods Compendiums S-001, S-002, S-020, S-028, S-029 and Q-002. Samples were collected and composited in-situ using stainless steel trowels and placed in ½ liter plastic containers with lids. In some cases, a rock hammer or spud bar was used to loosen the soil prior to sample collection. The majority of the locations were within or beneath cobble-size rock used for soil stabilization at the compound. The cobble was removed allowing the collection of finer grained soil for the samples. All equipment was thoroughly decontaminated using non-phosphate detergent and distilled water between sample locations. The samples were field-screened by a radiological control technician at the site and screened by the Mound Soil Screening Laboratory prior to shipment to the contract laboratory.

The only variance to the scope of work encountered during the verification sampling of the Compound was the moving of one location a short distance to obtain a more representative sample. Location SU3-CMPD-068 was offset approximately 3.5 feet to the west. The original location was marked on top of a concrete slab. No other variances to the scope of work were encountered during the verification sampling.

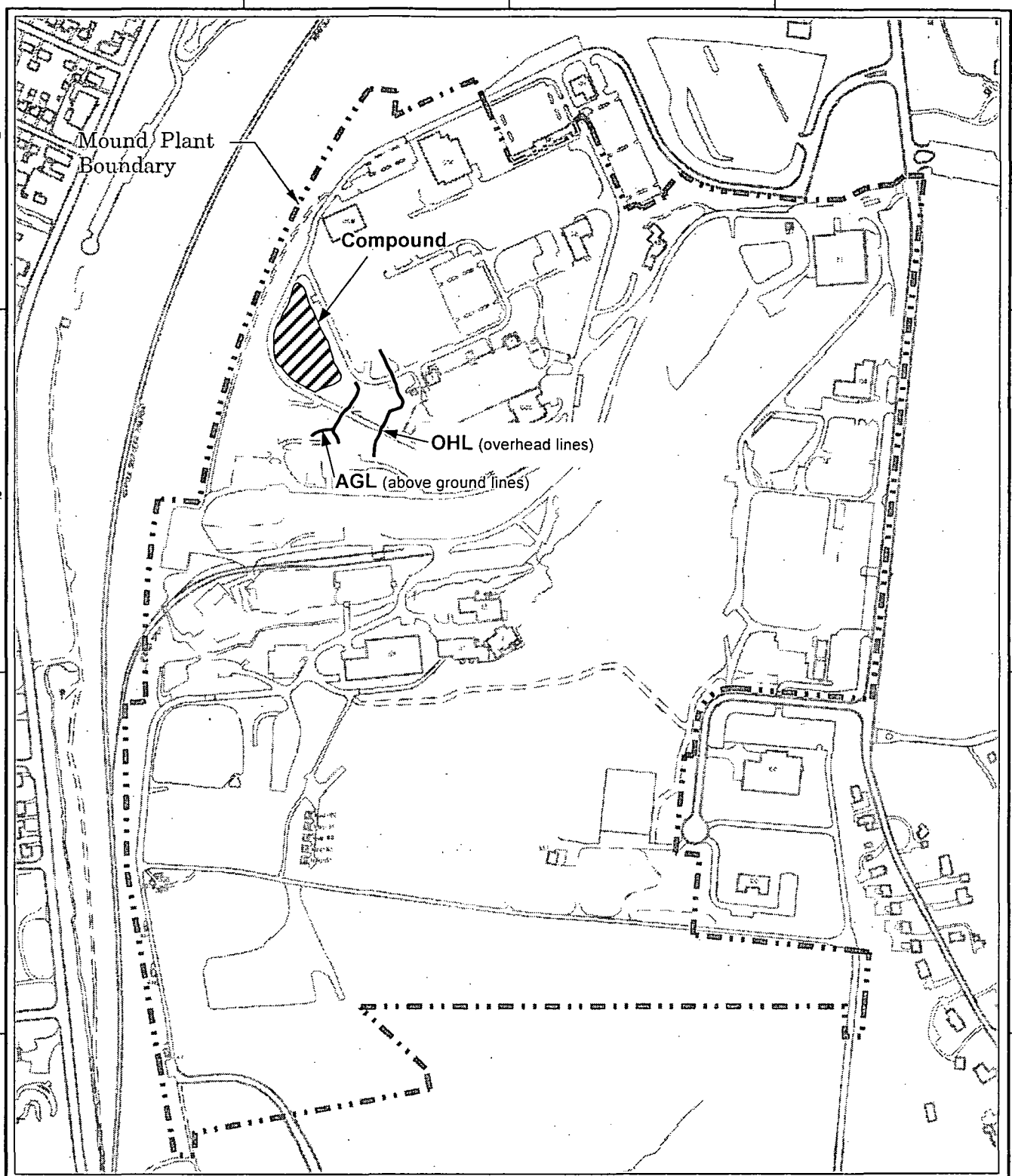
4.0 DATA REVIEW / VALIDATION

AGL/OHL. Review of the RASS data by the Core Team supports that the data are usable for verification purposes. Although not required to be validated, per Mound Laboratory procedures, onsite laboratories are required to perform QC (quality control) checks such as instrument calibration checks, source checks, background checks, and efficiency checks.

COMPOUND. For the Compound, all data were reviewed and 10% of offsite data were validated. Field and laboratory QC were assessed as part of the R&V process. Documentation of review and validation (and related variances) for the Compound results is provided in Appendix E. Review and validation supports that the data are usable.

APPENDIX A

FIGURES



Legend

Structures
Paved roadway
Unpaved roadway
Mound Plant boundary
Railroad

0 100 200 400 600 800 1000
Scale in Feet

MOUND
Environmental Restoration Geographic Information System

Figure 1:
Location of AGL/OHL & Compound

ISS	DATE	REVISION	BY	CHKR	ENG	LPMEC	APVD	W
	10/18/05		SSF					

DWG TYPE STE | PRNG ER-GIS | CAXEC | SCALE | SHEET 1 OF
STATUS MD-REL-**/**/** | ORIGIN MSTATION / J

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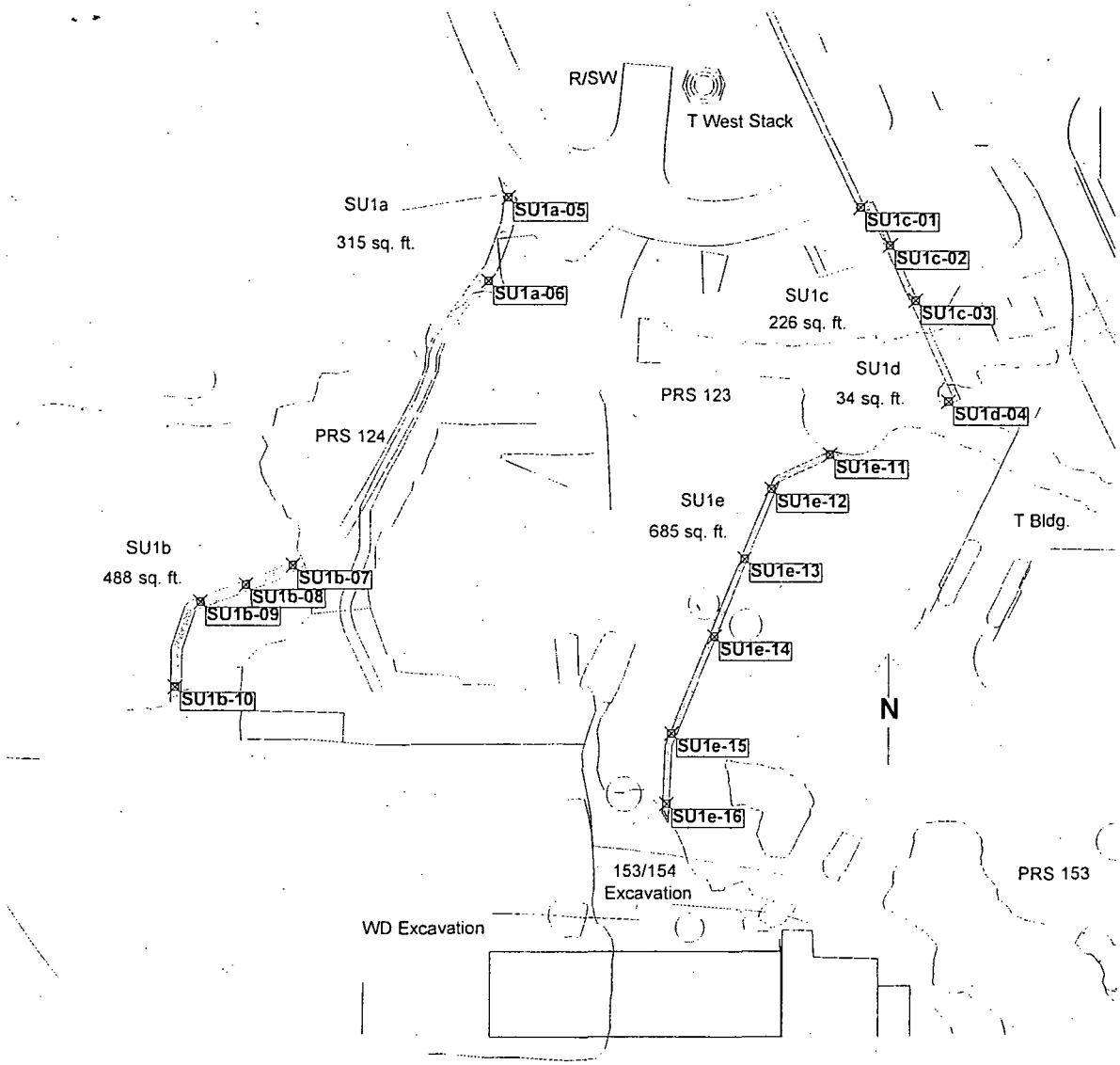


Figure 2: AGL/OHL Sample Locations

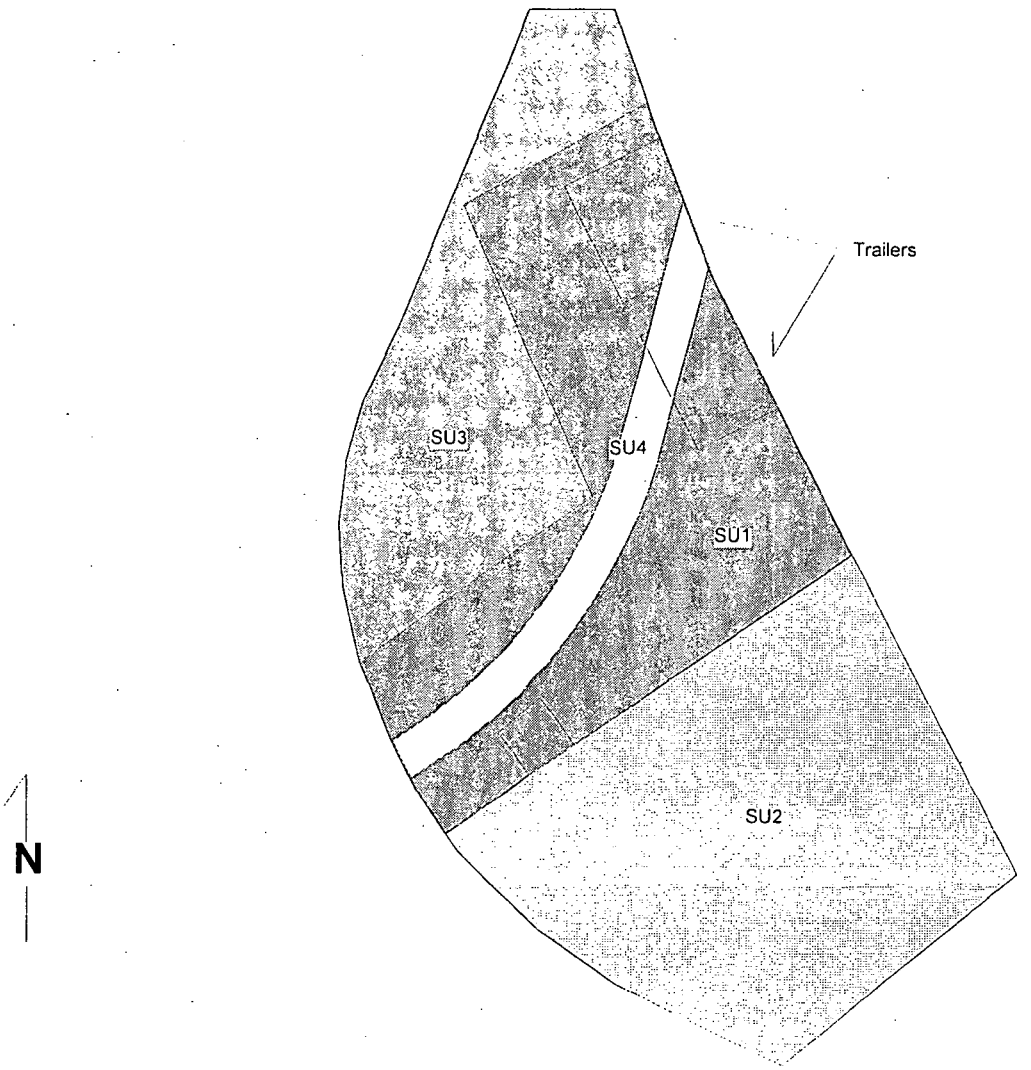
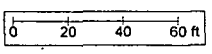


Figure 3: Compound SUs 1-4



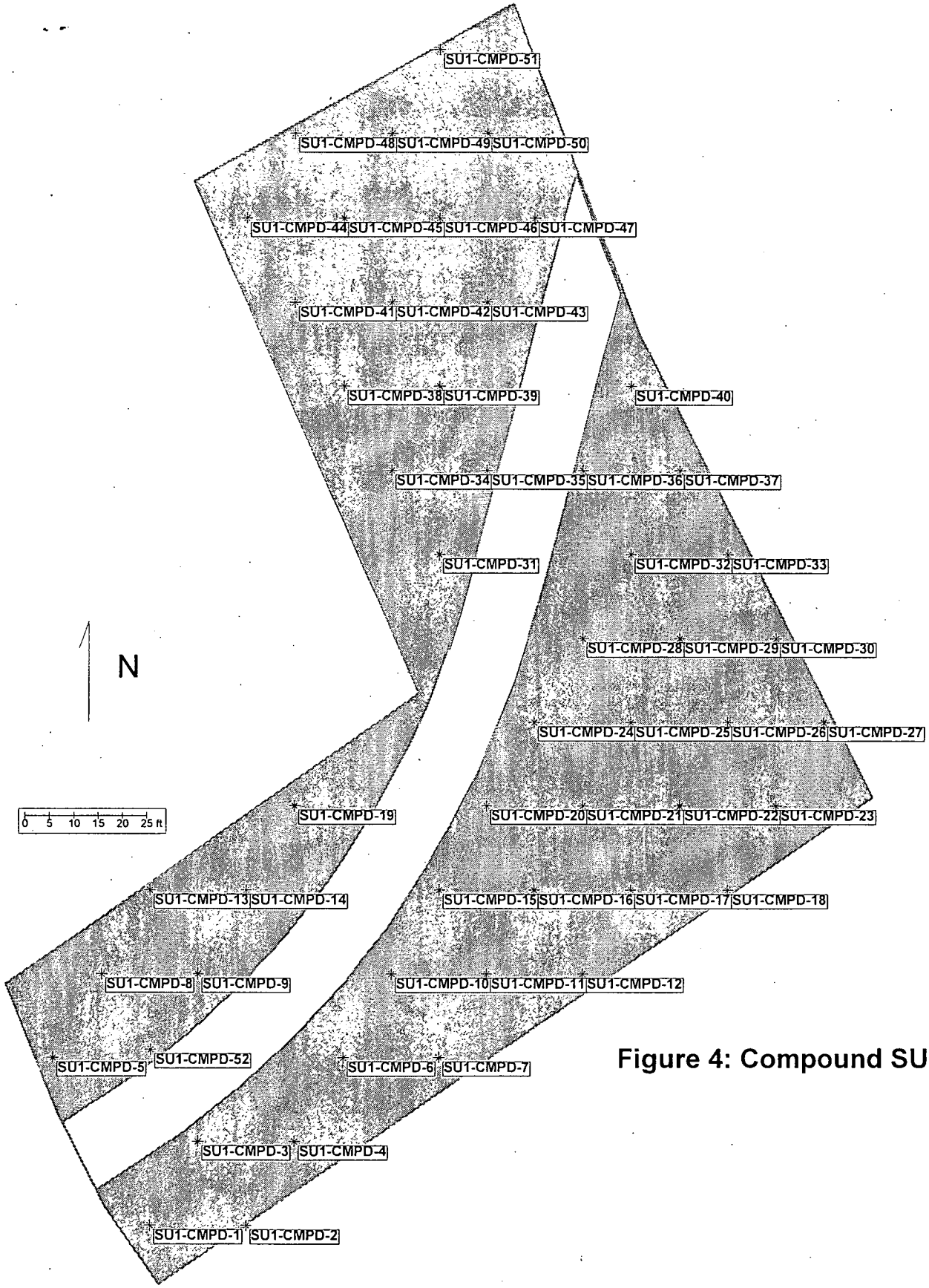


Figure 4: Compound SU1

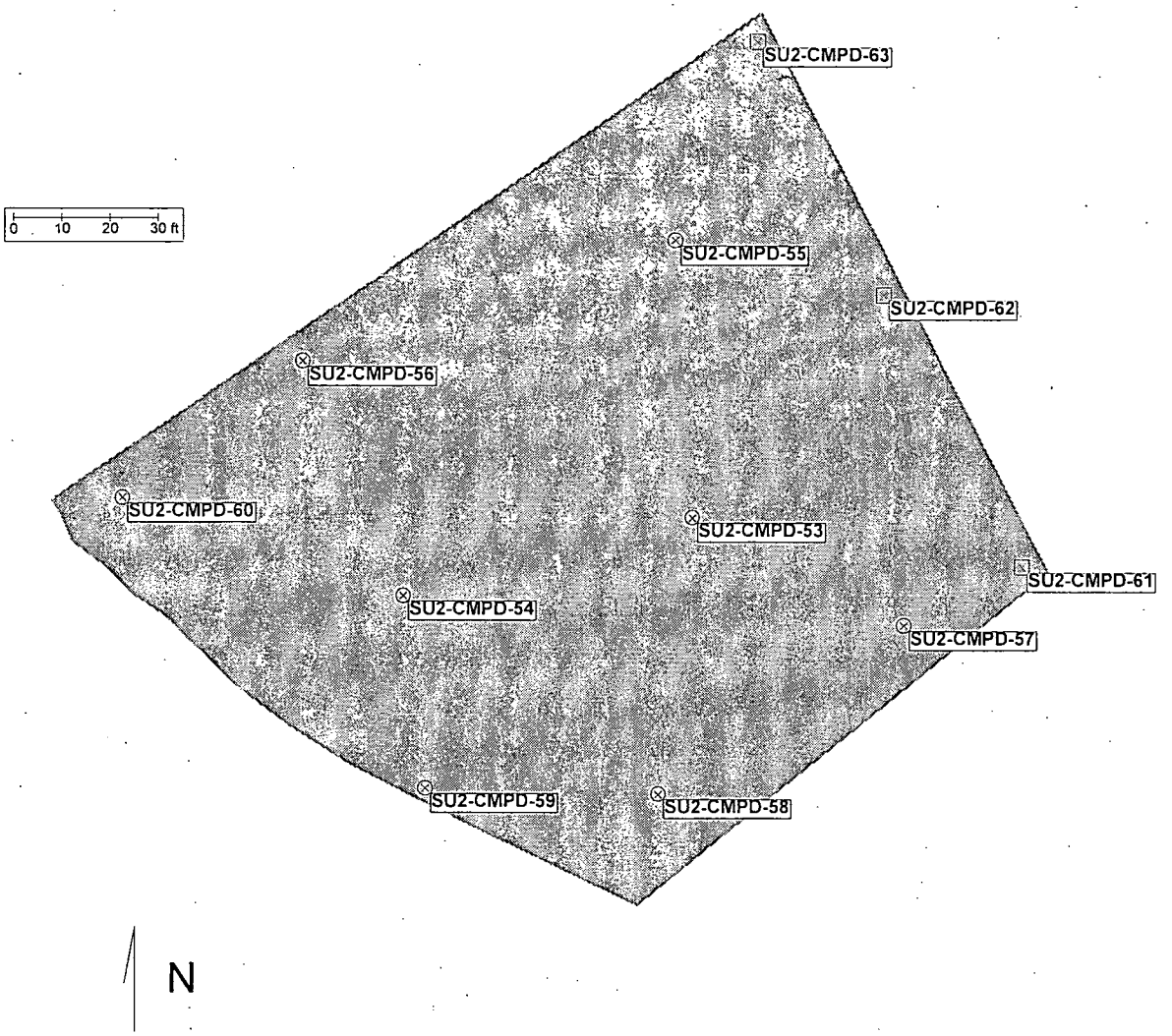


Figure 5: Compound SU2

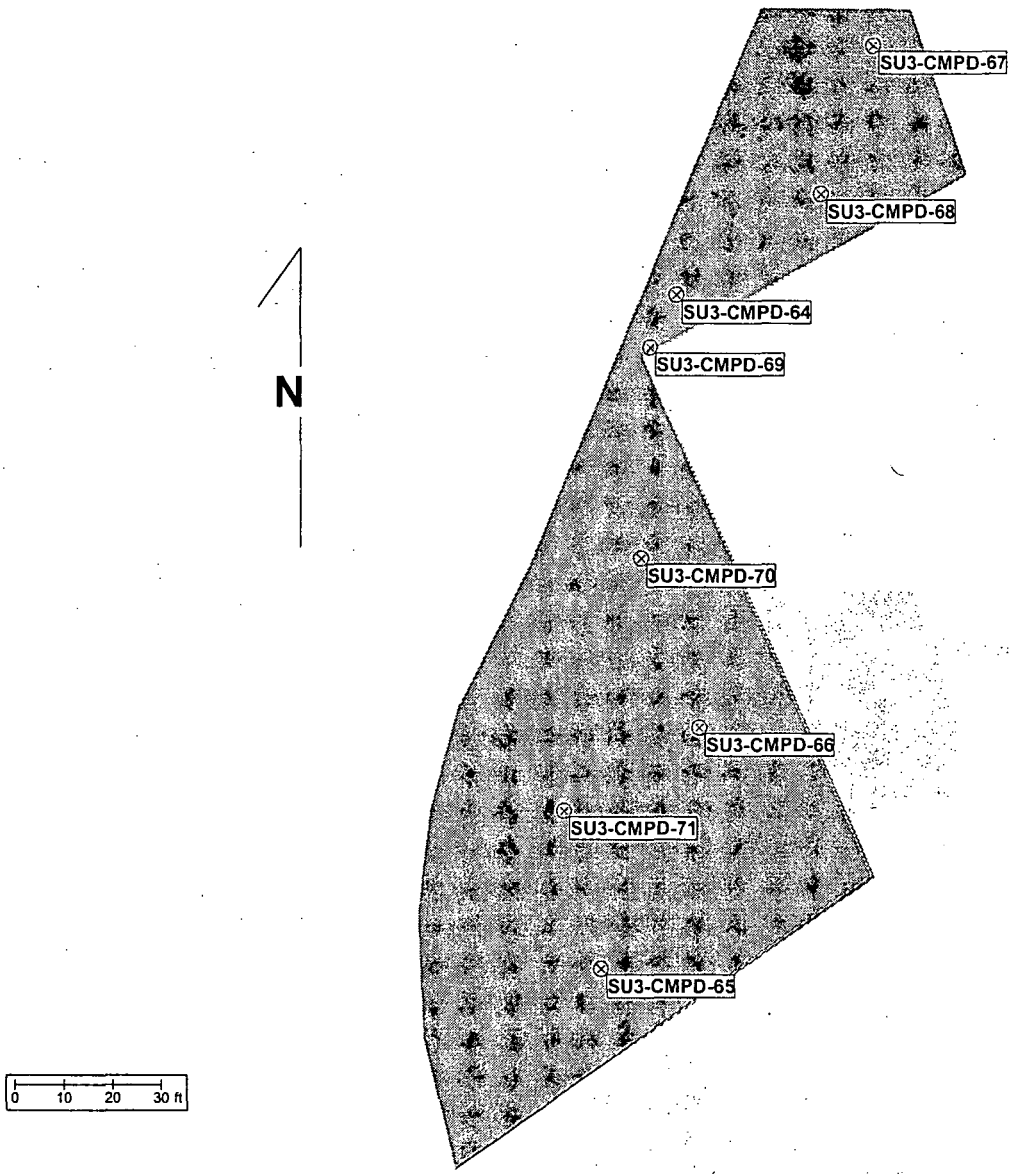


Figure 6: Compound SU3

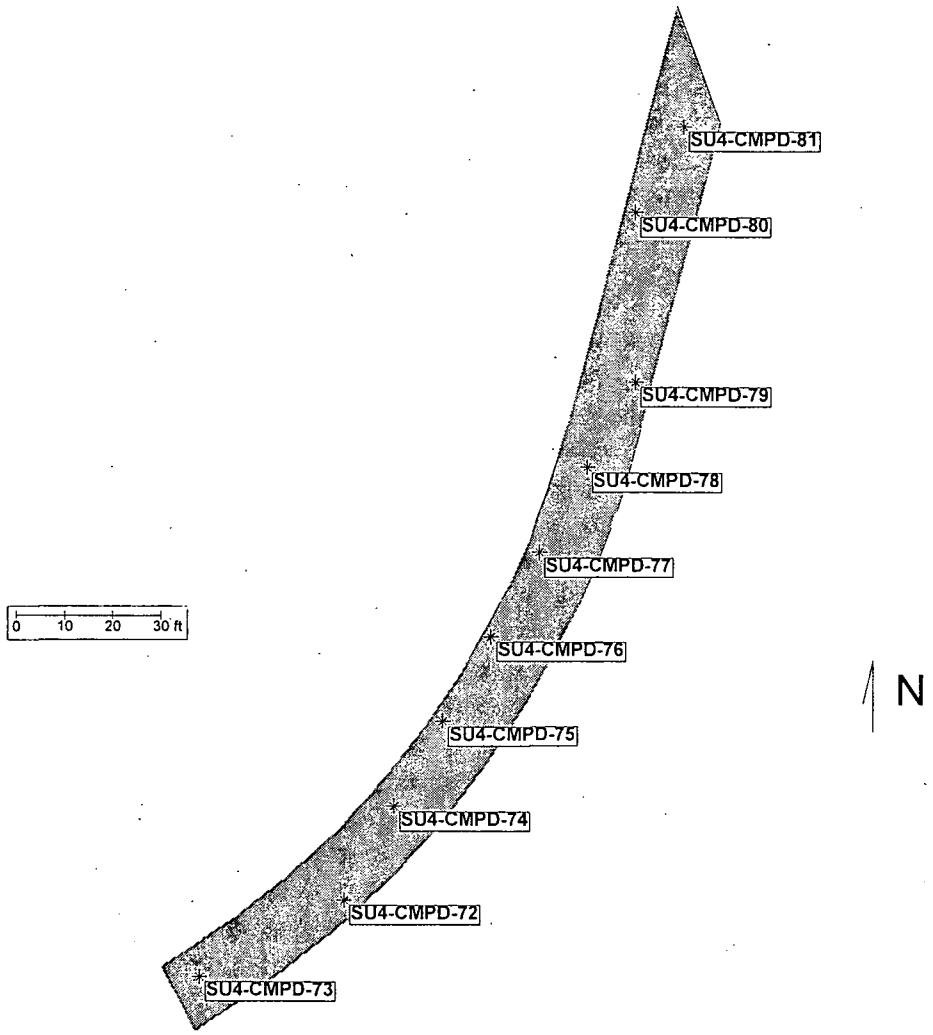


Figure 7: Compound SU4

APPENDIX B

TABLES

A15/61

Table 1: AGL/OHL Verification Results (pCi/g)

[gross beta offsite, rest of results onsite]

Location (Figure 2)	MEIMS ID	Date	Analyte	CO	Result	DL	DQ	LQ	Coordinates Easting	Coordinates Northing
SU1a-05	SU1a-05	20060107	Actinium-227	4.6	0.26	0.26		U	1464690	598766.6
SU1a-05	SU1a-05	20060107	Americium-241	63	0.07	0.07		U	1464690	598766.6
SU1a-05	SU1a-05	20060107	Cesium-137	3.8	0.06	0.06		U	1464690	598766.6
SU1a-05	SU1a-05	20060107	Cobalt-60	0.7	0.07	0.07		U	1464690	598766.6
SU1a-05	SU1a-05	20060107	Lead-210	7.4	1.11	0.66			1464690	598766.6
SU1a-05	SU1a-05	20060107	Plutonium-238	55	16.58	16.58		U	1464690	598766.6
SU1a-05	SU1a-05	20060107	Radium-226	2.9	1.84	0.87			1464690	598766.6
SU1a-05	SU1a-05	20060107	Thorium-230	2.8[c]	7.03	7.03		U	1464690	598766.6
SU1a-05	SU1a-05	20060107	Thorium-232	2.1	0.75	0.29			1464690	598766.6
SU1a-06	SU1a-06	20060107	Actinium-227	4.6	0.32	0.32		U	1464681	598737.3
SU1a-06	SU1a-06	20060107	Americium-241	63	0.09	0.09		U	1464681	598737.3
SU1a-06	SU1a-06	20060107	Cesium-137	3.8	0.15	0.07			1464681	598737.3
SU1a-06	SU1a-06	20060107	Cobalt-60	0.7	0.11	0.11		U	1464681	598737.3
SU1a-06	SU1a-06	20060107	Gross Beta	94.72[a]	29.4	5			1464681	598737.3
SU1a-06	SU1a-06	20060107	Lead-210	7.4	2.63	0.92			1464681	598737.3
SU1a-06	SU1a-06	20060107	Plutonium-238	55	21.87	21.87		U	1464681	598737.3
SU1a-06	SU1a-06	20060107	Radium-226	2.9	1.9	0.96			1464681	598737.3
SU1a-06	SU1a-06	20060107	Thorium-230	2.8[c]	8.92	8.92		U	1464681	598737.3
SU1a-06	SU1a-06	20060107	Thorium-232	2.1	0.65	0.44			1464681	598737.3
SU1a-06	SU1a-06	20060107	Tritium	75[b]	0.4	ns			1464681	598737.3
SU1b-07	SU1b-07	20060107	Actinium-227	4.6	0.26	0.26		U	1464591	598606.4
SU1b-07	SU1b-07	20060107	Americium-241	63	0.08	0.08		U	1464591	598606.4
SU1b-07	SU1b-07	20060107	Cesium-137	3.8	0.05	0.05		U	1464591	598606.4
SU1b-07	SU1b-07	20060107	Cobalt-60	0.7	0.09	0.09		U	1464591	598606.4
SU1b-07	SU1b-07	20060107	Gross Beta	94.72[a]	35.1	4.8			1464591	598606.4
SU1b-07	SU1b-07	20060107	Lead-210	7.4	0.72	0.72		U	1464591	598606.4
SU1b-07	SU1b-07	20060107	Plutonium-238	55	16.3	16.3		U	1464591	598606.4
SU1b-07	SU1b-07	20060107	Radium-226	2.9	1.14	0.74			1464591	598606.4
SU1b-07	SU1b-07	20060107	Thorium-230	2.8[c]	7.06	7.06		U	1464591	598606.4
SU1b-07	SU1b-07	20060107	Thorium-232	2.1	0.63	0.29			1464591	598606.4
SU1b-07	SU1b-07	20060107	Tritium	75[b]	0.2	ns			1464591	598606.4
SU1b-08	SU1b-08	20060107	Actinium-227	4.6	0.29	0.29		U	1464568	598596.6
SU1b-08	SU1b-08	20060107	Americium-241	63	0.08	0.08		U	1464568	598596.6
SU1b-08	SU1b-08	20060107	Cesium-137	3.8	0.06	0.06			1464568	598596.6
SU1b-08	SU1b-08	20060107	Cobalt-60	0.7	0.06	0.06		U	1464568	598596.6
SU1b-08	SU1b-08	20060107	Lead-210	7.4	1.75	0.79			1464568	598596.6
SU1b-08	SU1b-08	20060107	Plutonium-238	55	21.09	21.09		U	1464568	598596.6
SU1b-08	SU1b-08	20060107	Radium-226	2.9	1.13	0.82			1464568	598596.6
SU1b-08	SU1b-08	20060107	Thorium-230	2.8[c]	7.59	7.59		U	1464568	598596.6
SU1b-08	SU1b-08	20060107	Thorium-232	2.1	0.52	0.33			1464568	598596.6
SU1b-09	SU1b-09	20060107	Actinium-227	4.6	0.33	0.33		U	1464545	598589.3

A16/61

Table 1: AGL/OHL Verification Results (pCi/g)

[gross beta offsite, rest of results onsite]

Location (Figure 2)	MEIMS ID	Date	Analyte	CO	Result	DL	DQ	LQ	Coordinates Easting	Coordinates Northing
SU1b-09	SU1b-09	20060107	Americium-241	63	0.09	0.09		U	1464545	598589.3
SU1b-09	SU1b-09	20060107	Cesium-137	3.8	0.16	0.06			1464545	598589.3
SU1b-09	SU1b-09	20060107	Cobalt-60	0.7	0.08	0.08		U	1464545	598589.3
SU1b-09	SU1b-09	20060107	Lead-210	7.4	1.86	0.86			1464545	598589.3
SU1b-09	SU1b-09	20060107	Plutonium-238	55	20.41	20.41		U	1464545	598589.3
SU1b-09	SU1b-09	20060107	Radium-226	2.9	1.39	0.88			1464545	598589.3
SU1b-09	SU1b-09	20060107	Thorium-230	2.8[c]	9.23	9.23		U	1464545	598589.3
SU1b-09	SU1b-09	20060107	Thorium-232	2.1	0.92	0.28			1464545	598589.3
SU1b-10	SU1b-10	20060107	Actinium-227	4.6	0.24	0.24		U	1464535	598549.2
SU1b-10	SU1b-10	20060107	Americium-241	63	0.08	0.08		U	1464535	598549.2
SU1b-10	SU1b-10	20060107	Cesium-137	3.8	0.06	0.06		U	1464535	598549.2
SU1b-10	SU1b-10	20060107	Cobalt-60	0.7	0.11	0.11		U	1464535	598549.2
SU1b-10	SU1b-10	20060107	Lead-210	7.4	0.94	0.71			1464535	598549.2
SU1b-10	SU1b-10	20060107	Plutonium-238	55	17.49	17.49		U	1464535	598549.2
SU1b-10	SU1b-10	20060107	Radium-226	2.9	1.77	0.84			1464535	598549.2
SU1b-10	SU1b-10	20060107	Thorium-230	2.8[c]	7.45	7.45		U	1464535	598549.2
SU1b-10	SU1b-10	20060107	Thorium-232	2.1	0.75	0.31			1464535	598549.2
SU1c-01	SU2a-01	20060107	Actinium-227	4.6	0.28	0.28		U	1464854	598768.3
SU1c-01	SU2a-01	20060107	Americium-241	63	0.08	0.08		U	1464854	598768.3
SU1c-01	SU2a-01	20060107	Cesium-137	3.8	0.09	0.04			1464854	598768.3
SU1c-01	SU2a-01	20060107	Cobalt-60	0.7	0.05	0.05		U	1464854	598768.3
SU1c-01	SU2a-01	20060107	Lead-210	7.4	2.51	0.9			1464854	598768.3
SU1c-01	SU2a-01	20060107	Plutonium-238	55	15.97	15.97		U	1464854	598768.3
SU1c-01	SU2a-01	20060107	Radium-226	2.9	1.62	0.85			1464854	598768.3
SU1c-01	SU2a-01	20060107	Thorium-230	2.8[c]	8.22	8.22		U	1464854	598768.3
SU1c-01	SU2a-01	20060107	Thorium-232	2.1	0.55	0.02			1464854	598768.3
SU1c-02	SU2a-02	20060107	Actinium-227	4.6	0.25	0.25		U	1464867	598752.1
SU1c-02	SU2a-02	20060107	Americium-241	63	0.07	0.07		U	1464867	598752.1
SU1c-02	SU2a-02	20060107	Cesium-137	3.8	0.05	0.05		U	1464867	598752.1
SU1c-02	SU2a-02	20060107	Cobalt-60	0.7	0.09	0.09		U	1464867	598752.1
SU1c-02	SU2a-02	20060107	Lead-210	7.4	2.31	0.7			1464867	598752.1
SU1c-02	SU2a-02	20060107	Plutonium-238	55	17.99	17.99		U	1464867	598752.1
SU1c-02	SU2a-02	20060107	Radium-226	2.9	1.18	0.76			1464867	598752.1
SU1c-02	SU2a-02	20060107	Thorium-230	2.8[c]	6.99	6.99		U	1464867	598752.1
SU1c-02	SU2a-02	20060107	Thorium-232	2.1	0.48	0.3			1464867	598752.1
SU1c-03	SU2a-03	20060107	Actinium-227	4.6	0.29	0.29		U	1464879	598725.5
SU1c-03	SU2a-03	20060107	Americium-241	63	0.08	0.08		U	1464879	598725.5
SU1c-03	SU2a-03	20060107	Cesium-137	3.8	0.17	0.06			1464879	598725.5
SU1c-03	SU2a-03	20060107	Cobalt-60	0.7	0.4	0.1			1464879	598725.5
SU1c-03	SU2a-03	20060107	Lead-210	7.4	0.82	0.82		U	1464879	598725.5
SU1c-03	SU2a-03	20060107	Plutonium-238	55	16.32	16.32		U	1464879	598725.5

A17/61

Table 1: AGL/OHL Verification Results (pCi/g)

[gross beta offsite, rest of results onsite]

Location (Figure 2)	MEIMS ID	Date	Analyte	CO	Result	DL	DQ	LQ	Coordinates Easting	Coordinates Northing
SU1c-03	SU2a-03	20060107	Radium-226	2.9	1.31	0.84			1464879	598725.5
SU1c-03	SU2a-03	20060107	Thorium-230	2.8[c]	8.36	8.36		U	1464879	598725.5
SU1c-03	SU2a-03	20060107	Thorium-232	2.1	0.88	0.25			1464879	598725.5
SU1d-04	SU2b-04	20060107	Actinium-227	4.6	0.18	0.18		U	1464894	598680.7
SU1d-04	SU2b-04	20060107	Americium-241	63	0.05	0.05		U	1464894	598680.7
SU1d-04	SU2b-04	20060107	Cesium-137	3.8	0.03	0.03		U	1464894	598680.7
SU1d-04	SU2b-04	20060107	Cobalt-60	0.7	0.04	0.04		U	1464894	598680.7
SU1d-04	SU2b-04	20060107	Lead-210	7.4	0.91	0.5			1464894	598680.7
SU1d-04	SU2b-04	20060107	Plutonium-238	55	10.45	10.45		U	1464894	598680.7
SU1d-04	SU2b-04	20060107	Radium-226	2.9	1.82	0.65			1464894	598680.7
SU1d-04	SU2b-04	20060107	Thorium-230	2.8[c]	5.21	5.21		U	1464894	598680.7
SU1d-04	SU2b-04	20060107	Thorium-232	2.1	0.31	0.18			1464894	598680.7
SU1e-11	SU2c-11	20060107	Actinium-227	4.6	0.25	0.25		U	1464838	598655.3
SU1e-11	SU2c-11	20060107	Americium-241	63	0.07	0.07		U	1464838	598655.3
SU1e-11	SU2c-11	20060107	Cesium-137	3.8	0.05	0.05		U	1464838	598655.3
SU1e-11	SU2c-11	20060107	Cobalt-60	0.7	0.06	0.06		U	1464838	598655.3
SU1e-11	SU2c-11	20060107	Lead-210	7.4	0.64	0.64		U	1464838	598655.3
SU1e-11	SU2c-11	20060107	Plutonium-238	55	15.76	15.76		U	1464838	598655.3
SU1e-11	SU2c-11	20060107	Radium-226	2.9	1.47	0.72			1464838	598655.3
SU1e-11	SU2c-11	20060107	Thorium-230	2.8[c]	6.26	6.26		U	1464838	598655.3
SU1e-11	SU2c-11	20060107	Thorium-232	2.1	0.51	0.17			1464838	598655.3
SU1e-12	SU2c-12	20060107	Actinium-227	4.6	0.23	0.23		U	1464813	598641.9
SU1e-12	SU2c-12	20060107	Americium-241	63	0.07	0.07		U	1464813	598641.9
SU1e-12	SU2c-12	20060107	Cesium-137	3.8	0.09	0.04			1464813	598641.9
SU1e-12	SU2c-12	20060107	Cobalt-60	0.7	0.06	0.06			1464813	598641.9
SU1e-12	SU2c-12	20060107	Lead-210	7.4	1.44	0.67			1464813	598641.9
SU1e-12	SU2c-12	20060107	Plutonium-238	55	15.32	15.32		U	1464813	598641.9
SU1e-12	SU2c-12	20060107	Radium-226	2.9	1.43	0.77			1464813	598641.9
SU1e-12	SU2c-12	20060107	Thorium-230	2.8[c]	6.67	6.67		U	1464813	598641.9
SU1e-12	SU2c-12	20060107	Thorium-232	2.1	0.62	0.23			1464813	598641.9
SU1e-13	SU2c-13	20060107	Actinium-227	4.6	0.22	0.22		U	1464799	598609.5
SU1e-13	SU2c-13	20060107	Americium-241	63	0.06	0.06		U	1464799	598609.5
SU1e-13	SU2c-13	20060107	Cesium-137	3.8	0.03	0.03			1464799	598609.5
SU1e-13	SU2c-13	20060107	Cobalt-60	0.7	0.07	0.07		U	1464799	598609.5
SU1e-13	SU2c-13	20060107	Lead-210	7.4	0.57	0.53			1464799	598609.5
SU1e-13	SU2c-13	20060107	Plutonium-238	55	11.82	11.82		U	1464799	598609.5
SU1e-13	SU2c-13	20060107	Radium-226	2.9	1.52	0.61			1464799	598609.5
SU1e-13	SU2c-13	20060107	Thorium-230	2.8[c]	5.91	5.91		U	1464799	598609.5
SU1e-13	SU2c-13	20060107	Thorium-232	2.1	0.4	0.23			1464799	598609.5
SU1e-14	SU2c-14	20060107	Actinium-227	4.6	0.25	0.25		U	1464783	598566.7
SU1e-14	SU2c-14	20060107	Americium-241	63	0.06	0.06		U	1464783	598566.7

A18/61

Table 1: AGL/OHL Verification Results (pCi/g)

[all analyses onsite]

Location (Figure 2)	MEIMS ID	Date	Analyte	CO	Result	DL	DQ	LQ	Coordinates Easting	Coordinates Northing
SU1e-14	SU2c-14	20060107	Cesium-137	3.8	0.05	0.05		U	1464783	598566.7
SU1e-14	SU2c-14	20060107	Cobalt-60	0.7	0.08	0.08		U	1464783	598566.7
SU1e-14	SU2c-14	20060107	Lead-210	7.4	0.59	0.59		U	1464783	598566.7
SU1e-14	SU2c-14	20060107	Plutonium-238	55	10.93	10.93		U	1464783	598566.7
SU1e-14	SU2c-14	20060107	Radium-226	2.9	0.72	0.72		U	1464783	598566.7
SU1e-14	SU2c-14	20060107	Thorium-230	2.8[c]	6.29	6.29		U	1464783	598566.7
SU1e-14	SU2c-14	20060107	Thorium-232	2.1	0.22	0.22		U	1464783	598566.7
SU1e-15	SU2c-15	20060107	Actinium-227	4.6	0.43	0.43		U	1464765	598529
SU1e-15	SU2c-15	20060107	Americium-241	63	0.11	0.11		U	1464765	598529
SU1e-15	SU2c-15	20060107	Cesium-137	3.8	0.08	0.08		U	1464765	598529
SU1e-15	SU2c-15	20060107	Cobalt-60	0.7	0.08	0.08		U	1464765	598529
SU1e-15	SU2c-15	20060107	Lead-210	7.4	1.08	0.92			1464765	598529
SU1e-15	SU2c-15	20060107	Plutonium-238	55	17.65	17.65		U	1464765	598529
SU1e-15	SU2c-15	20060107	Radium-226	2.9	1.94	1			1464765	598529
SU1e-15	SU2c-15	20060107	Thorium-230	2.8[c]	9.63	9.63		U	1464765	598529
SU1e-15	SU2c-15	20060107	Thorium-232	2.1	0.9	0.02			1464765	598529
SU1e-16	SU2c-16	20060107	Actinium-227	4.6	0.46	0.46		U	1464762	598494.9
SU1e-16	SU2c-16	20060107	Americium-241	63	0.11	0.11		U	1464762	598494.9
SU1e-16	SU2c-16	20060107	Cesium-137	3.8	0.09	0.05			1464762	598494.9
SU1e-16	SU2c-16	20060107	Cobalt-60	0.7	0.12	0.12		U	1464762	598494.9
SU1e-16	SU2c-16	20060107	Lead-210	7.4	1.03	1.03		U	1464762	598494.9
SU1e-16	SU2c-16	20060107	Plutonium-238	55	18.65	18.65		U	1464762	598494.9
SU1e-16	SU2c-16	20060107	Radium-226	2.9	1.39	1.11			1464762	598494.9
SU1e-16	SU2c-16	20060107	Thorium-230	2.8[c]	9.38	9.38		U	1464762	598494.9
SU1e-16	SU2c-16	20060107	Thorium-232	2.1	0.69	0.3			1464762	598494.9

MEIMS: Mound Environmental Information Management System
CO: cleanup objective
DQ: data qualifier
LQ: lab qualifier
DL: detection limit
U: not detected
ns: not specified
(a): activity assumed worst case to be all Sr-90, therefore the Sr-90 CO was used
(b): screening level for tritium is 75 pCi/g
(c): in order to be usable, Th-230 DL must be below 10 pCi/g and the activity must be at or below the DL

Table 2: Compound Verification Results (pCi/g)

[all analyses offsite]

Location	Date	Analyte	CO	Result	DL	DQ	LQ	Easting	Northing
CMPD-01	20051108	Plutonium-238	55	0.097	0.065	J	J	1464451	598815
CMPD-01	20051108	Plutonium-239/240	62	0.05	0.05	UJ	U	1464451	598815
CMPD-02	20051108	Plutonium-238	55	0.111	0.078	J	J	1464471	598815
CMPD-02	20051108	Plutonium-239/240	62	0.033	0.033	UJ	U	1464471	598815
CMPD-03	20051108	Plutonium-238	55	0.44	0.07			1464461	598832.3
CMPD-03	20051108	Plutonium-239/240	62	0.04	0.04	UJ	U	1464461	598832.3
CMPD-04	20051108	Plutonium-238	55	0.144	0.066	J	J	1464481	598832.3
CMPD-04	20051108	Plutonium-239/240	62	0.04	0.04	U	U	1464481	598832.3
CMPD-05	20051108	Plutonium-238	55	0.143	0.06	J	J	1464431	598849.6
CMPD-05	20051108	Plutonium-239/240	62	0.05	0.05	U	U	1464431	598849.6
CMPD-06	20051108	Plutonium-238	55	0.082	0.056	J	J	1464491	598849.6
CMPD-06	20051108	Plutonium-239/240	62	0.035	0.035	UJ	U	1464491	598849.6
CMPD-07	20051108	Plutonium-238	55	0.157	0.055	J	J	1464511	598849.6
CMPD-07	20051108	Plutonium-239/240	62	0.02	0.02	U	U	1464511	598849.6
CMPD-08	20051107	Plutonium-238	55	0.53	0.06			1464441	598866.9
CMPD-08	20051107	Plutonium-239/240	62	0.02	0.02	U	U	1464441	598866.9
CMPD-09	20051107	Plutonium-238	55	0.35	0.06			1464461	598866.9
CMPD-09	20051107	Plutonium-239/240	62	0.04	0.04	U	U	1464461	598866.9
CMPD-10	20051107	Plutonium-238	55	0.101	0.054	J	J	1464501	598866.9
CMPD-10	20051107	Plutonium-239/240	62	0.036	0.036	UJ	U	1464501	598866.9
CMPD-11	20051107	Plutonium-238	55	0.13	0.057	J	J	1464521	598866.9
CMPD-11	20051107	Plutonium-239/240	62	0.04	0.04	UJ	U	1464521	598866.9
CMPD-12	20051107	Plutonium-238	55	0.06	0.06	UJ	U	1464541	598866.9
CMPD-12	20051107	Plutonium-239/240	62	0.02	0.02	UJ	U	1464541	598866.9
CMPD-13	20051107	Plutonium-238	55	0.244	0.046			1464451	598884.3
CMPD-13	20051107	Plutonium-239/240	62	0.04	0.04	U	U	1464451	598884.3
CMPD-14	20051107	Plutonium-238	55	0.63	0.04			1464471	598884.3
CMPD-14	20051107	Plutonium-239/240	62	0.03	0.03	U	U	1464471	598884.3
CMPD-15	20051107	Plutonium-238	55	0.13	0.06	J	J	1464511	598884.3
CMPD-15	20051107	Plutonium-239/240	62	0.041	0.041	UJ	U	1464511	598884.3
CMPD-16	20051107	Plutonium-238	55	0.69	0.05			1464531	598884.3
CMPD-16	20051107	Plutonium-239/240	62	0.047	0.047	UJ	U	1464531	598884.3
CMPD-17	20051107	Plutonium-238	55	0.045	0.045	UJ	U	1464551	598884.3
CMPD-17	20051107	Plutonium-239/240	62	0.02	0.02	U	U	1464551	598884.3
CMPD-18	20051107	Plutonium-238	55	0.075	0.055	J	J	1464571	598884.3
CMPD-18	20051107	Plutonium-239/240	62	0.04	0.04	U	U	1464571	598884.3
CMPD-19	20051107	Plutonium-238	55	0.05	0.05	U	U	1464481	598901.6
CMPD-19	20051107	Plutonium-239/240	62	0.033	0.033	UJ	U	1464481	598901.6
CMPD-20	20051107	Plutonium-238	55	0.112	0.052	J	J	1464521	598901.6
CMPD-20	20051107	Plutonium-239/240	62	0.033	0.033	UJ	U	1464521	598901.6
CMPD-21	20051107	Plutonium-238	55	0.037	0.037	UJ	U	1464541	598901.6
CMPD-21	20051107	Plutonium-239/240	62	0.037	0.037	UJ	U	1464541	598901.6
CMPD-22	20051107	Plutonium-238	55	0.268	0.053			1464561	598901.6
CMPD-22	20051107	Plutonium-239/240	62	0.046	0.046	UJ	U	1464561	598901.6
CMPD-23	20051107	Plutonium-238	55	1.15	0.05			1464581	598901.6
CMPD-23	20051107	Plutonium-239/240	62	0.021	0.021	UJ	U	1464581	598901.6
CMPD-24	20051107	Plutonium-238	55	0.112	0.052	J	J	1464531	598918.9
CMPD-24	20051107	Plutonium-239/240	62	0.045	0.045	UJ	U	1464531	598918.9
CMPD-25	20051107	Plutonium-238	55	0.051	0.051	UJ	U	1464551	598918.9
CMPD-25	20051107	Plutonium-239/240	62	0.044	0.044	UJ	U	1464551	598918.9

A20/61

Table 2: Compound Verification Results (pCi/g)

[all analyses offsite]

Location	Date	Analyte	CO	Result	DL	DQ	LQ	Easting	Northing
CMPD-26	20051107	Plutonium-238	55	0.196	0.052	J	J	1464571	598918.9
CMPD-26	20051107	Plutonium-239/240	62	0.02	0.02	U	U	1464571	598918.9
CMPD-27	20051107	Plutonium-238	55	0.135	0.055	J	J	1464591	598918.9
CMPD-27	20051107	Plutonium-239/240	62	0.048	0.048	UJ	U	1464591	598918.9
CMPD-28	20051108	Plutonium-238	55	0.079	0.064	J	J	1464541	598936.2
CMPD-28	20051108	Plutonium-239/240	62	0.044	0.044	UJ	U	1464541	598936.2
CMPD-29	20051110	Plutonium-238	55	0.096	0.069	J	J	1464561	598936.2
CMPD-29	20051110	Plutonium-239/240	62	0.05	0.05	UJ	U	1464561	598936.2
CMPD-30	20051108	Plutonium-238	55	0.079	0.079	UJ	U	1464581	598936.2
CMPD-30	20051108	Plutonium-239/240	62	0.04	0.04	U	U	1464581	598936.2
CMPD-31	20051107	Plutonium-238	55	0.051	0.051	U	U	1464511	598953.5
CMPD-31	20051107	Plutonium-239/240	62	0.02	0.02	U	U	1464511	598953.5
CMPD-32	20051107	Plutonium-238	55	1.31	0.06			1464551	598953.5
CMPD-32	20051107	Plutonium-239/240	62	0.06	0.06	U	U	1464551	598953.5
CMPD-33	20051107	Plutonium-238	55	0.076	0.076	UJ	U	1464571	598953.5
CMPD-33	20051107	Plutonium-239/240	62	0.07	0.07	U	U	1464571	598953.5
CMPD-34	20051107	Plutonium-238	55	0.094	0.07	J	J	1464501	598970.9
CMPD-34	20051107	Plutonium-239/240	62	0.022	0.022	UJ	U	1464501	598970.9
CMPD-35	20051107	Plutonium-238	55	0.123	0.072	J	J	1464521	598970.9
CMPD-35	20051107	Plutonium-239/240	62	0.045	0.045	UJ	U	1464521	598970.9
CMPD-36	20051107	Plutonium-238	55	0.062	0.062	UJ	U	1464541	598970.9
CMPD-36	20051107	Plutonium-239/240	62	0.021	0.021	UJ	U	1464541	598970.9
CMPD-37	20051107	Plutonium-238	55	0.41	0.06			1464561	598970.9
CMPD-37	20051107	Plutonium-239/240	62	0.05	0.05	U	U	1464561	598970.9
CMPD-38	20051110	Plutonium-238	55	0.08	0.08	UJ	U	1464491	598988.2
CMPD-38	20051110	Plutonium-239/240	62	0.03	0.03	U	U	1464491	598988.2
CMPD-39	20051107	Plutonium-238	55	0.069	0.069	UJ	U	1464511	598988.2
CMPD-39	20051107	Plutonium-239/240	62	0.04	0.04	U	U	1464511	598988.2
CMPD-40	20051107	Plutonium-238	55	0.069	0.069	UJ	U	1464551	598988.2
CMPD-40	20051107	Plutonium-239/240	62	0.04	0.04	U	U	1464551	598988.2
CMPD-41	20051107	Plutonium-238	55	0.09	0.078	J	J	1464481	599005.5
CMPD-41	20051107	Plutonium-239/240	62	0.05	0.05	U	U	1464481	599005.5
CMPD-42	20051107	Plutonium-238	55	0.091	0.073	J	J	1464501	599005.5
CMPD-42	20051107	Plutonium-239/240	62	0.05	0.05	U	U	1464501	599005.5
CMPD-43D	20051108	Plutonium-238	55	0.063	0.063	UJ	U	1464521	599005.5
CMPD-43	20051108	Plutonium-238	55	0.069	0.069	UJ	U	1464521	599005.5
CMPD-43D	20051108	Plutonium-239/240	62	0.05	0.05	UJ	U	1464521	599005.5
CMPD-43	20051108	Plutonium-239/240	62	0.036	0.036	UJ	U	1464521	599005.5
CMPD-44	20051107	Plutonium-238	55	0.094	0.054	J	J	1464471	599022.8
CMPD-44	20051107	Plutonium-239/240	62	0.02	0.02	U	U	1464471	599022.8
CMPD-45	20051107	Plutonium-238	55	0.062	0.062	UJ	U	1464491	599022.8
CMPD-45	20051107	Plutonium-239/240	62	0.02	0.02	U	U	1464491	599022.8
CMPD-46	20051107	Plutonium-238	55	0.36	0.06			1464511	599022.8
CMPD-46	20051107	Plutonium-239/240	62	0.044	0.044	UJ	U	1464511	599022.8
CMPD-47	20051107	Plutonium-238	55	0.85	0.07			1464531	599022.8
CMPD-47	20051107	Plutonium-239/240	62	0.023	0.021	J	J	1464531	599022.8
CMPD-48	20051107	Plutonium-238	55	0.066	0.066	UJ	U	1464481	599040.2
CMPD-48	20051107	Plutonium-239/240	62	0.044	0.044	UJ	U	1464481	599040.2
CMPD-49	20051107	Plutonium-238	55	0.38	0.08			1464501	599040.2
CMPD-49	20051107	Plutonium-239/240	62	0.039	0.039	UJ	U	1464501	599040.2

A21/61

Table 2: Compound Verification Results (pCi/g)

[all analyses offsite]

Location	Date	Analyte	CO	Result	DL	DQ	LQ	Easting	Northing
CMPD-50	20051107	Plutonium-238	55	0.71	0.07			1464521	599040.2
CMPD-50	20051107	Plutonium-239/240	62	0.033	0.033	UJ	U	1464521	599040.2
CMPD-51	20051107	Plutonium-238	55	0.58	0.08			1464511	599057.5
CMPD-51	20051107	Plutonium-239/240	62	0.044	0.044	UJ	U	1464511	599057.5
CMPD-52	20051108	Plutonium-238	55	0.086	0.082	J	J	1464451	598851.3
CMPD-52	20051108	Plutonium-239/240	62	0.058	0.058	UJ	U	1464451	598851.3
CMPD-53	20051108	Plutonium-238	55	0.072	0.072	UJ	U	1464587	598798.6
CMPD-53	20051108	Plutonium-239/240	62	0.02	0.02	U	U	1464587	598798.6
CMPD-54	20051108	Plutonium-238	55	0.064	0.064	UJ	U	1464526	598782.6
CMPD-54	20051108	Plutonium-239/240	62	0.048	0.048	UJ	U	1464526	598782.6
CMPD-55	20051108	Plutonium-238	55	0.166	0.051	J	J	1464583	598856
CMPD-55	20051108	Plutonium-239/240	62	0.037	0.037	UJ	U	1464583	598856
CMPD-56	20051108	Plutonium-238	55	0.079	0.058	J	J	1464505	598831.4
CMPD-56	20051108	Plutonium-239/240	62	0.02	0.02	U	U	1464505	598831.4
CMPD-57	20051108	Plutonium-238	55	0.72	0.05			1464631	598776.2
CMPD-57	20051108	Plutonium-239/240	62	0.022	0.019	J	J	1464631	598776.2
CMPD-58	20051108	Plutonium-238	55	0.38	0.06			1464579	598741.2
CMPD-58	20051108	Plutonium-239/240	62	0.041	0.041	UJ	U	1464579	598741.2
CMPD-59	20051108	Plutonium-238	55	0.246	0.044			1464530	598742.6
CMPD-59	20051108	Plutonium-239/240	62	0.039	0.039	UJ	U	1464530	598742.6
CMPD-60	20051108	Plutonium-238	55	0.102	0.051	J	J	1464467	598803
CMPD-60	20051108	Plutonium-239/240	62	0.039	0.039	UJ	U	1464467	598803
CMPD-61	20051108	Plutonium-238	55	0.067	0.067	U	U	1464656	598788.2
CMPD-61	20051108	Plutonium-239/240	62	0.03	0.03	U	U	1464656	598788.2
CMPD-62	20051108	Plutonium-238	55	0.056	0.056	UJ	U	1464627	598844.7
CMPD-62	20051108	Plutonium-239/240	62	0.044	0.044	UJ	U	1464627	598844.7
CMPD-63	20051108	Plutonium-238	55	0.137	0.044	J	J	1464600	598897
CMPD-63	20051108	Plutonium-239/240	62	0.04	0.04	U	U	1464600	598897
CMPD-64	20051107	Plutonium-238	55	0.125	0.04	J	J	1464467	599043
CMPD-64	20051107	Plutonium-239/240	62	0.034	0.034	UJ	U	1464467	599043
CMPD-65	20051107	Plutonium-238	55	0.113	0.059	J	J	1464451	598905.9
CMPD-65	20051107	Plutonium-239/240	62	0.038	0.038	UJ	U	1464451	598905.9
CMPD-66	20051107	Plutonium-238	55	1.92	0.05			1464471	598955
CMPD-66	20051107	Plutonium-239/240	62	0.049	0.046	J	J	1464471	598955
CMPD-67	20051107	Plutonium-238	55	0.038	0.038	UJ	U	1464507	599093.5
CMPD-67	20051107	Plutonium-239/240	62	0.038	0.038	UJ	U	1464507	599093.5
CMPD-68D	20051108	Plutonium-238	55	0.63	0.05			1464496	599063.4
CMPD-68	20051108	Plutonium-238	55	0.73	0.05			1464496	599063.4
CMPD-68D	20051108	Plutonium-239/240	62	0.04	0.04	UJ	U	1464496	599063.4
CMPD-68	20051108	Plutonium-239/240	62	0.024	0.021	J	J	1464496	599063.4
CMPD-69	20051107	Plutonium-238	55	0.139	0.047	J	J	1464461	599032.5
CMPD-69	20051107	Plutonium-239/240	62	0.022	0.022	UJ	U	1464461	599032.5
CMPD-70D	20051107	Plutonium-238	55	0.067	0.067	U	U	1464459	598989.4
CMPD-70	20051107	Plutonium-238	55	0.053	0.051	J	J	1464459	598989.4
CMPD-70D	20051107	Plutonium-239/240	62	0.048	0.048	UJ	U	1464459	598989.4
CMPD-70	20051107	Plutonium-239/240	62	0.038	0.038	UJ	U	1464459	598989.4
CMPD-71	20051107	Plutonium-238	55	1.06	0.05			1464443	598937.9
CMPD-71	20051107	Plutonium-239/240	62	0.032	0.032	UJ	U	1464443	598937.9
CMPD-72D	20051107	Plutonium-238	55	0.082	0.082	UJ	U	1464471	598849.6
CMPD-72	20051107	Plutonium-238	55	0.052	0.052	U	U	1464471	598849.6

A22/61

Table 2: Compound Verification Results (pCi/g)

[all analyses offsite]

Location	Date	Analyte	CO	Result	DL	DQ	LQ	Easting	Northing
CMPD-72D	20051107	Plutonium-239/240	62	0.043	0.043	UJ	U	1464471	598849.6
CMPD-72	20051107	Plutonium-239/240	62	0.02	0.02	UJ	U	1464471	598849.6
CMPD-72D	20051107	Tritium	75[(a)]	0.34	0.34	UJ	U	1464471	598849.6
CMPD-72	20051107	Tritium	75[(a)]	0.33	0.33	U	U	1464471	598849.6
CMPD-73	20051107	Plutonium-238	55	0.066	0.066	UJ	U	1464441	598834
CMPD-73	20051107	Plutonium-239/240	62	0.043	0.043	UJ	U	1464441	598834
CMPD-73	20051107	Tritium	75[(a)]	0.32	0.32	UJ	U	1464441	598834
CMPD-74	20051107	Plutonium-238	55	0.134	0.053	J	J	1464481	598868.6
CMPD-74	20051107	Plutonium-239/240	62	0.037	0.037	UJ	U	1464481	598868.6
CMPD-74	20051107	Tritium	75[(a)]	0.42	0.33	J	J	1464481	598868.6
CMPD-75	20051107	Plutonium-238	55	0.286	0.049			1464491	598886
CMPD-75	20051107	Plutonium-239/240	62	0.038	0.038	UJ	U	1464491	598886
CMPD-75	20051107	Tritium	75[(a)]	0.62	0.32	J	J	1464491	598886
CMPD-76	20051107	Plutonium-238	55	0.153	0.035	J	J	1464501	598903.3
CMPD-76	20051107	Plutonium-239/240	62	0.035	0.035	UJ	U	1464501	598903.3
CMPD-76	20051107	Tritium	75[(a)]	0.32	0.32	UJ	U	1464501	598903.3
CMPD-77	20051107	Plutonium-238	55	0.046	0.046	UJ	U	1464511	598920.6
CMPD-77	20051107	Plutonium-239/240	62	0.036	0.036	UJ	U	1464511	598920.6
CMPD-77	20051107	Tritium	75[(a)]	0.32	0.32	U	U	1464511	598920.6
CMPD-78	20051107	Plutonium-238	55	0.046	0.046	UJ	U	1464521	598937.9
CMPD-78	20051107	Plutonium-239/240	62	0.036	0.036	UJ	U	1464521	598937.9
CMPD-78	20051107	Tritium	75[(a)]	0.33	0.33	UJ	U	1464521	598937.9
CMPD-79	20051107	Plutonium-238	55	0.041	0.041	UJ	U	1464531	598955.3
CMPD-79	20051107	Plutonium-239/240	62	0.04	0.04	U	U	1464531	598955.3
CMPD-79	20051107	Tritium	75[(a)]	0.33	0.33	U	U	1464531	598955.3
CMPD-80	20051107	Plutonium-238	55	0.052	0.052	UJ	U	1464531	598989.9
CMPD-80	20051107	Plutonium-239/240	62	0.021	0.021	UJ	U	1464531	598989.9
CMPD-80	20051107	Tritium	75[(a)]	0.32	0.32	UJ	U	1464531	598989.9
CMPD-81	20051107	Plutonium-238	55	27.6	0.06			1464541	599007.2
CMPD-81	20051107	Plutonium-239/240	62	0.34	0.02			1464541	599007.2
CMPD-81	20051107	Tritium	75[(a)]	0.32	0.32	UJ	U	1464541	599007.2

CO: cleanup objective
DQ: data qualifier
LQ: lab qualifier
DL: detection limit
U: not detected
J: estimated
D: duplicate
(a): screening level for tritium is 75 pCi/g

A23/61

Table 3: AGL/OHL Standard Deviation Calculations

Location	Analyte	CO	Result
SU1a-05	Actinium-227	4.6	0.26
SU1a-06	Actinium-227	4.6	0.32
SU1b-07	Actinium-227	4.6	0.26
SU1b-08	Actinium-227	4.6	0.29
SU1b-09	Actinium-227	4.6	0.33
SU1b-10	Actinium-227	4.6	0.24
SU1c-01	Actinium-227	4.6	0.28
SU1c-02	Actinium-227	4.6	0.25
SU1c-03	Actinium-227	4.6	0.29
SU1d-04	Actinium-227	4.6	0.18
SU1e-11	Actinium-227	4.6	0.25
SU1e-12	Actinium-227	4.6	0.23
SU1e-13	Actinium-227	4.6	0.22
SU1e-14	Actinium-227	4.6	0.25
SU1e-15	Actinium-227	4.6	0.43
SU1e-16	Actinium-227	4.6	0.46
	STD DEV Ac-227		**0.07311**
SU1a-05	Americium-241	63	0.07
SU1a-06	Americium-241	63	0.09
SU1b-07	Americium-241	63	0.08
SU1b-08	Americium-241	63	0.08
SU1b-09	Americium-241	63	0.09
SU1b-10	Americium-241	63	0.08
SU1c-01	Americium-241	63	0.08
SU1c-02	Americium-241	63	0.07
SU1c-03	Americium-241	63	0.08
SU1d-04	Americium-241	63	0.05
SU1e-11	Americium-241	63	0.07
SU1e-12	Americium-241	63	0.07
SU1e-13	Americium-241	63	0.06
SU1e-14	Americium-241	63	0.06
SU1e-15	Americium-241	63	0.11
SU1e-16	Americium-241	63	0.11
	STD DEV Am-241		**0.016419**
SU1a-05	Cesium-137	3.8	0.06
SU1a-06	Cesium-137	3.8	0.15
SU1b-07	Cesium-137	3.8	0.05
SU1b-08	Cesium-137	3.8	0.06
SU1b-09	Cesium-137	3.8	0.16
SU1b-10	Cesium-137	3.8	0.06
SU1c-01	Cesium-137	3.8	0.09
SU1c-02	Cesium-137	3.8	0.05
SU1c-03	Cesium-137	3.8	0.17
SU1d-04	Cesium-137	3.8	0.03
SU1e-11	Cesium-137	3.8	0.05
SU1e-12	Cesium-137	3.8	0.09
SU1e-13	Cesium-137	3.8	0.03
SU1e-14	Cesium-137	3.8	0.05
SU1e-15	Cesium-137	3.8	0.08
SU1e-16	Cesium-137	3.8	0.09
	STD DEV Cs-137		**0.044342**
SU1a-05	Cobalt-60	0.7	0.07
SU1a-06	Cobalt-60	0.7	0.11
SU1b-07	Cobalt-60	0.7	0.09
SU1b-08	Cobalt-60	0.7	0.06
SU1b-09	Cobalt-60	0.7	0.08
SU1b-10	Cobalt-60	0.7	0.11
SU1c-01	Cobalt-60	0.7	0.05
SU1c-02	Cobalt-60	0.7	0.09
SU1c-03	Cobalt-60	0.7	0.4
SU1d-04	Cobalt-60	0.7	0.04

A24/61

Table 3: AGL/OHL Standard Deviation Calculations

Location	Analyte	CO	Result
SU1e-11	Cobalt-60	0.7	0.06
SU1e-12	Cobalt-60	0.7	0.06
SU1e-13	Cobalt-60	0.7	0.07
SU1e-14	Cobalt-60	0.7	0.08
SU1e-15	Cobalt-60	0.7	0.08
SU1e-16	Cobalt-60	0.7	0.12
	STD DEV Co-60		**0.083524**

SU1a-05	Lead-210	7.4	1.11
SU1a-06	Lead-210	7.4	2.63
SU1b-07	Lead-210	7.4	0.72
SU1b-08	Lead-210	7.4	1.75
SU1b-09	Lead-210	7.4	1.86
SU1b-10	Lead-210	7.4	0.94
SU1c-01	Lead-210	7.4	2.51
SU1c-02	Lead-210	7.4	2.31
SU1c-03	Lead-210	7.4	0.82
SU1d-04	Lead-210	7.4	0.91
SU1e-11	Lead-210	7.4	0.64
SU1e-12	Lead-210	7.4	1.44
SU1e-13	Lead-210	7.4	0.57
SU1e-14	Lead-210	7.4	0.59
SU1e-15	Lead-210	7.4	1.08
SU1e-16	Lead-210	7.4	1.03
	STD DEV Pb-210		**0.696015**

SU1a-05	Plutonium-238	55	16.58
SU1a-06	Plutonium-238	55	21.87
SU1b-07	Plutonium-238	55	16.3
SU1b-08	Plutonium-238	55	21.09
SU1b-09	Plutonium-238	55	20.41
SU1b-10	Plutonium-238	55	17.49
SU1c-01	Plutonium-238	55	15.97
SU1c-02	Plutonium-238	55	17.99
SU1c-03	Plutonium-238	55	16.32
SU1d-04	Plutonium-238	55	10.45
SU1e-11	Plutonium-238	55	15.76
SU1e-12	Plutonium-238	55	15.32
SU1e-13	Plutonium-238	55	11.82
SU1e-14	Plutonium-238	55	10.93
SU1e-15	Plutonium-238	55	17.65
SU1e-16	Plutonium-238	55	18.65
	STD DEV Pu-238		**3.328116**

SU1a-05	Radium-226	2.9	1.84
SU1a-06	Radium-226	2.9	1.9
SU1b-07	Radium-226	2.9	1.14
SU1b-08	Radium-226	2.9	1.13
SU1b-09	Radium-226	2.9	1.39
SU1b-10	Radium-226	2.9	1.77
SU1c-01	Radium-226	2.9	1.62
SU1c-02	Radium-226	2.9	1.18
SU1c-03	Radium-226	2.9	1.31
SU1d-04	Radium-226	2.9	1.82
SU1e-11	Radium-226	2.9	1.47
SU1e-12	Radium-226	2.9	1.43
SU1e-13	Radium-226	2.9	1.52
SU1e-14	Radium-226	2.9	0.72
SU1e-15	Radium-226	2.9	1.94
SU1e-16	Radium-226	2.9	1.39
	STD DEV Ra-226		**0.335772**

SU1a-05	Thorium-230	2.8[c]	7.03

A25/61

Table 3: AGL/OHL Standard Deviation Calculations

Location	Analyte	CO	Result
SU1a-06	Thorium-230	2.8(c)	8.92
SU1b-07	Thorium-230	2.8(c)	7.06
SU1b-08	Thorium-230	2.8(c)	7.59
SU1b-09	Thorium-230	2.8(c)	9.23
SU1b-10	Thorium-230	2.8(c)	7.45
SU1c-01	Thorium-230	2.8(c)	8.22
SU1c-02	Thorium-230	2.8(c)	6.99
SU1c-03	Thorium-230	2.8(c)	8.36
SU1d-04	Thorium-230	2.8(c)	5.21
SU1e-11	Thorium-230	2.8(c)	6.26
SU1e-12	Thorium-230	2.8(c)	6.67
SU1e-13	Thorium-230	2.8(c)	5.91
SU1e-14	Thorium-230	2.8(c)	6.29
SU1e-15	Thorium-230	2.8(c)	9.63
SU1e-16	Thorium-230	2.8(c)	9.38
	STD DEV Th-230		**1.328761**

SU1a-05	Thorium-232	2.1	0.75
SU1a-06	Thorium-232	2.1	0.65
SU1b-07	Thorium-232	2.1	0.63
SU1b-08	Thorium-232	2.1	0.52
SU1b-09	Thorium-232	2.1	0.92
SU1b-10	Thorium-232	2.1	0.75
SU1c-01	Thorium-232	2.1	0.55
SU1c-02	Thorium-232	2.1	0.48
SU1c-03	Thorium-232	2.1	0.88
SU1d-04	Thorium-232	2.1	0.31
SU1e-11	Thorium-232	2.1	0.51
SU1e-12	Thorium-232	2.1	0.62
SU1e-13	Thorium-232	2.1	0.4
SU1e-14	Thorium-232	2.1	0.22
SU1e-15	Thorium-232	2.1	0.9
SU1e-16	Thorium-232	2.1	0.69
	STD DEV Th-232		**0.204218**

CO: cleanup objective

(c): in order to be usable, Th-230 MDA must be below 10 and the activity must be at or below the MDA

Table 4: Compound Standard Deviation Calculations

Location	Analyte	CO	Result
CMPD-01	Plutonium-238	55	0.097
CMPD-02	Plutonium-238	55	0.111
CMPD-03	Plutonium-238	55	0.440
CMPD-04	Plutonium-238	55	0.144
CMPD-05	Plutonium-238	55	0.143
CMPD-06	Plutonium-238	55	0.082
CMPD-07	Plutonium-238	55	0.157
CMPD-08	Plutonium-238	55	0.530
CMPD-09	Plutonium-238	55	0.350
CMPD-10	Plutonium-238	55	0.101
CMPD-11	Plutonium-238	55	0.130
CMPD-12	Plutonium-238	55	0.060
CMPD-13	Plutonium-238	55	0.244
CMPD-14	Plutonium-238	55	0.630
CMPD-15	Plutonium-238	55	0.130
CMPD-16	Plutonium-238	55	0.690
CMPD-17	Plutonium-238	55	0.045
CMPD-18	Plutonium-238	55	0.075
CMPD-19	Plutonium-238	55	0.050
CMPD-20	Plutonium-238	55	0.112
CMPD-21	Plutonium-238	55	0.037
CMPD-22	Plutonium-238	55	0.268
CMPD-23	Plutonium-238	55	1.150
CMPD-24	Plutonium-238	55	0.112
CMPD-25	Plutonium-238	55	0.051
CMPD-26	Plutonium-238	55	0.196
CMPD-27	Plutonium-238	55	0.135
CMPD-28	Plutonium-238	55	0.079
CMPD-29	Plutonium-238	55	0.096
CMPD-30	Plutonium-238	55	0.079
CMPD-31	Plutonium-238	55	0.051
CMPD-32	Plutonium-238	55	1.310
CMPD-33	Plutonium-238	55	0.076
CMPD-34	Plutonium-238	55	0.094
CMPD-35	Plutonium-238	55	0.123
CMPD-36	Plutonium-238	55	0.062
CMPD-37	Plutonium-238	55	0.410
CMPD-38	Plutonium-238	55	0.080
CMPD-39	Plutonium-238	55	0.069
CMPD-40	Plutonium-238	55	0.069
CMPD-41	Plutonium-238	55	0.090
CMPD-42	Plutonium-238	55	0.091
CMPD-43	Plutonium-238	55	0.069
CMPD-44	Plutonium-238	55	0.094
CMPD-45	Plutonium-238	55	0.062
CMPD-46	Plutonium-238	55	0.360
CMPD-47	Plutonium-238	55	0.850
CMPD-48	Plutonium-238	55	0.066
CMPD-49	Plutonium-238	55	0.380
CMPD-50	Plutonium-238	55	0.710
CMPD-51	Plutonium-238	55	0.580
CMPD-52	Plutonium-238	55	0.086
	SU 1 STD DEV Pu-238		**0.283**
CMPD-53	Plutonium-238	55	0.072
CMPD-54	Plutonium-238	55	0.064
CMPD-55	Plutonium-238	55	0.166
CMPD-56	Plutonium-238	55	0.079
CMPD-57	Plutonium-238	55	0.720
CMPD-58	Plutonium-238	55	0.380
CMPD-59	Plutonium-238	55	0.246
CMPD-60	Plutonium-238	55	0.102
CMPD-61	Plutonium-238	55	0.067
CMPD-62	Plutonium-238	55	0.056
CMPD-63	Plutonium-238	55	0.137
	SU 2 STD DEV Pu-238		**0.202**

A27/61

Table 4: Compound Standard Deviation Calculations

Location	Analyte	CO	Result
CMPD-64	Plutonium-238	55	0.125
CMPD-65	Plutonium-238	55	0.113
CMPD-66	Plutonium-238	55	1.920
CMPD-67	Plutonium-238	55	0.038
CMPD-68	Plutonium-238	55	0.730
CMPD-69	Plutonium-238	55	0.139
CMPD-70	Plutonium-238	55	0.053
CMPD-71	Plutonium-238	55	1.060
	SU 3 STD DEV Pu-238		**0.677**
CMPD-72	Plutonium-238	55	0.052
CMPD-73	Plutonium-238	55	0.066
CMPD-74	Plutonium-238	55	0.134
CMPD-75	Plutonium-238	55	0.286
CMPD-76	Plutonium-238	55	0.153
CMPD-77	Plutonium-238	55	0.046
CMPD-78	Plutonium-238	55	0.046
CMPD-79	Plutonium-238	55	0.041
CMPD-80	Plutonium-238	55	0.052
CMPD-81	Plutonium-238	55	27.600
	SU 4 STD DEV Pu-238		**8.697**
CMPD-72	Tritium	75[a]	0.330
CMPD-73	Tritium	75[a]	0.320
CMPD-74	Tritium	75[a]	0.420
CMPD-75	Tritium	75[a]	0.620
CMPD-76	Tritium	75[a]	0.320
CMPD-77	Tritium	75[a]	0.320
CMPD-78	Tritium	75[a]	0.330
CMPD-79	Tritium	75[a]	0.330
CMPD-80	Tritium	75[a]	0.320
CMPD-81	Tritium	75[a]	0.320
	SU 4 STD DEV tritium		**0.095**

CO: cleanup objective

(a): screening level for tritium is 75 pCi/g

A28/61

Table 5: AGL/OHL Recalculation of N

Sample Standard Deviation (s)	Radionuclide	Cleanup Objective	Units
0.073	Ac-227+D	4.6	(pCi/g)
0.016	Am-241	63	(pCi/g)
	Ce-141	38	(pCi/g)
0.044	Cs-137+D	3.8	(pCi/g)
0.084	Co-60	0.7	(pCi/g)
	Cu-244	92	(pCi/g)
0.696	Pb-210+D	7.4	(pCi/g)
	Np-237+D	10.4	(pCi/g)
	Ni-95	2.5	(pCi/g)
3.328	Pu-238	55	(pCi/g)
	Pu-239/240	62	(pCi/g)
	Pa-231+D	4	(pCi/g)
0.336	Ra-226+D	2.9	(pCi/g)
	Ra-228	2.1	(pCi/g)
	Th-228+D	2.6	(pCi/g)
1.329	Th-230+D	2.8	(pCi/g)
0.204	Th-232+D	2.1	(pCi/g)
	U-233+D	4.8	(pCi/g)
	U-234	106.1	(pCi/g)
	U-234+D	2	(pCi/g)
	U-235	16.11	(pCi/g)
	U-235+D	3.2	(pCi/g)
	U-238	121.2	(pCi/g)
	U-238+D	2.2	(pCi/g)
	Bi-207	1.2	(pCi/g)
	Bi-210m	8.3	(pCi/g)
	Tc-99	2140	(pCi/g)
	tritium	7580	(pCi/g)
	Sr-90	94.72	(pCi/g)

Type I Error	0.05	
$Z_{1\text{-alpha}}$	1.645	
Type II Error	0.2	
$Z_{1\text{-beta}}$	0.842	
Effective	0.52	*(s)*
Sign p	0.864334	

Calculate the Total Effective (s)

Estimate (N) - Sign Test

DCGL	1
LBGR	0.38
Delta	0.62
(s)	0.52
Rel Shift	1.181
(N)	15.00

Pu-238 Area Factor (N) na, Class 3

Sample Grid Spacing

SU Area	162.56	m^2
Grid Length	3.1	m
Grid Height	2.7	m

Sample Grid Spacing

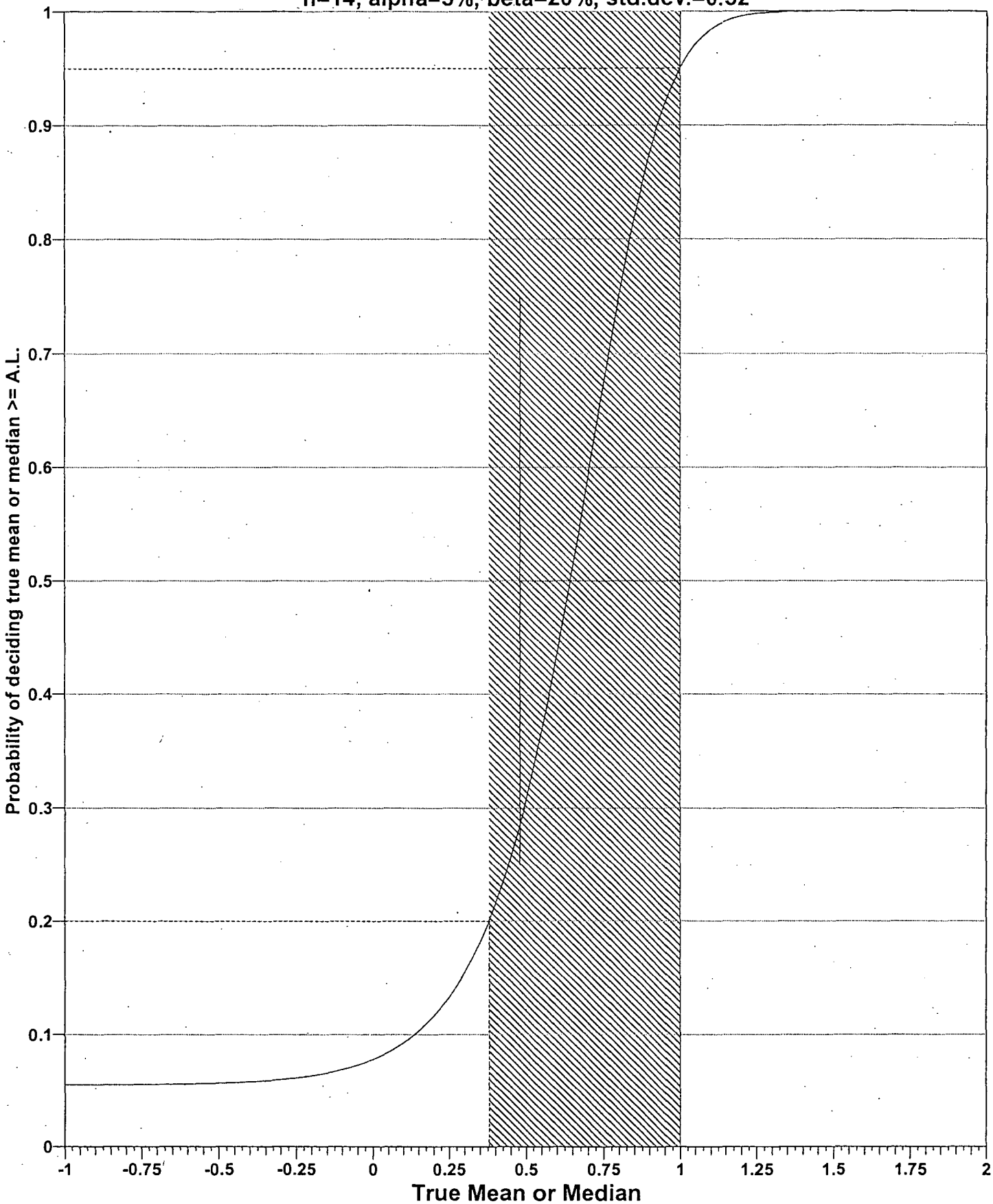
SU Area	17.48	ft^2
Grid Length	10.1	ft
Grid Height	8.7	ft

PRS	AGL/OHL
Survey Unit	SU1

A29/61

Table 6: AGL/OHL Power Curve

n=14, alpha=5%, beta=20%, std.dev.=0.52



A30/61

Table 7: Compound Recalculations of N

Sample Standard Deviation (s)	Radionuclide	Cleanup Objective	Units
	Ac-227+D	4.6	(pCi/g)
	Am-241	63	(pCi/g)
	Ce-141	38	(pCi/g)
	Cs-137+D	3.8	(pCi/g)
	Co-60	0.7	(pCi/g)
	Cu-244	92	(pCi/g)
	Pb-210+D	7.4	(pCi/g)
	Np-237+D	10.4	(pCi/g)
	Ni-95	2.5	(pCi/g)
0.283	Pu-238	55	(pCi/g)
	Pu-239/240	62	(pCi/g)
	Pa-231+D	4	(pCi/g)
	Ra-226+D	2.9	(pCi/g)
	Ra-228	2.1	(pCi/g)
	Th-228+D	2.6	(pCi/g)
	Th-230+D	2.8	(pCi/g)
	Th-232+D	2.1	(pCi/g)
	U-233+D	4.8	(pCi/g)
	U-234	106.1	(pCi/g)
	U-234+D	2	(pCi/g)
	U-235	16.11	(pCi/g)
	U-235+D	3.2	(pCi/g)
	U-238	121.2	(pCi/g)
	U-238+D	2.2	(pCi/g)
	Bi-207	1.2	(pCi/g)
	Bi-210m	8.3	(pCi/g)
	Tc-99	2140	(pCi/g)
	Sr-90	94.72	(pCi/g)

Type I Error	0.05		
$Z_{1\text{-alpha}}$	1.645		
Type II Error	0.2		
$Z_{1\text{-beta}}$	0.842		
Effective	0.28	(s)	
Sign p	0.964070		

Calculate the Total Effective (s)

Estimate (N) - Sign Test

DCGL	55.00
LBGR	54.49
Delta	0.51
(s)	0.28
Rel Shift	1.802
(N)	9.00

Area Factor adjusted (N) 606

Sample Grid Spacing

SU Area	1,643	m^2	SU Area	17,682	ft^2
Grid Length	12.6	m	Grid Length	41.2	ft
Grid Height	10.9	m	Grid Height	35.7	ft

PRS Compound **Survey Unit** 1

A31/61

Table 7: Compound Recalculations of N

Sample Standard Deviation (s)	Radionuclide	Cleanup Objective	Units
	Ac-227+D	4.6	(pCi/g)
	Am-241	63	(pCi/g)
	Ce-141	38	(pCi/g)
	Cs-137+D	3.8	(pCi/g)
	Co-60	0.7	(pCi/g)
	Cu-244	92	(pCi/g)
	Pb-210+D	7.4	(pCi/g)
	Np-237+D	10.4	(pCi/g)
	Ni-95	2.5	(pCi/g)
0.202	Pu-238	55	(pCi/g)
	Pu-239/240	62	(pCi/g)
	Pa-231+D	4	(pCi/g)
	Ra-226+D	2.9	(pCi/g)
	Ra-228	2.1	(pCi/g)
	Th-228+D	2.6	(pCi/g)
	Th-230+D	2.8	(pCi/g)
	Th-232+D	2.1	(pCi/g)
	U-233+D	4.8	(pCi/g)
	U-234	106.1	(pCi/g)
	U-234+D	2	(pCi/g)
	U-235	16.11	(pCi/g)
	U-235+D	3.2	(pCi/g)
	U-238	121.2	(pCi/g)
	U-238+D	2.2	(pCi/g)
	Bi-207	1.2	(pCi/g)
	Bi-210m	8.3	(pCi/g)
	Tc-99	2140	(pCi/g)
	Sr-90	94.72	(pCi/g)

Type I Error	0.05		
$Z_{1\text{-alpha}}$	1.645		
Type II Error	0.2		
$Z_{1\text{-beta}}$	0.842		
Effective	0.20 (s)		
Sign p	0.993790		

Calculate the Total Effective (s)

Estimate (N) - Sign Test	
DCGL	55.00
LBGR	54.49
Delta	0.51
(s)	0.20
Rel Shift	2.525
(N)	8.00

Area Factor adjusted (N) 704

Sample Grid Spacing

SU Area	1,907	m^2	SU Area	20,532	ft^2
Grid Length	14.4	m	Grid Length	47.1	ft
Grid Height	12.4	m	Grid Height	40.8	ft

PRS	Compound	**Survey Unit**	2

A32/61

2/4

Table 7: Compound Recalculations of N

Sample Standard Deviation (s)	Radionuclide	Cleanup Objective	Units
	Ac-227+D	4.6	(pCi/g)
	Am-241	63	(pCi/g)
	Ce-141	38	(pCi/g)
	Cs-137+D	3.8	(pCi/g)
	Co-60	0.7	(pCi/g)
	Cu-244	92	(pCi/g)
	Pb-210+D	7.4	(pCi/g)
	Np-237+D	10.4	(pCi/g)
	Ni-95	2.5	(pCi/g)
0.677	Pu-238	55	(pCi/g)
	Pu-239/240	62	(pCi/g)
	Pa-231+D	4	(pCi/g)
	Ra-226+D	2.9	(pCi/g)
	Ra-228	2.1	(pCi/g)
	Th-228+D	2.6	(pCi/g)
	Th-230+D	2.8	(pCi/g)
	Th-232+D	2.1	(pCi/g)
	U-233+D	4.8	(pCi/g)
	U-234	106.1	(pCi/g)
	U-234+D	2	(pCi/g)
	U-235	16.11	(pCi/g)
	U-235+D	3.2	(pCi/g)
	U-238	121.2	(pCi/g)
	U-238+D	2.2	(pCi/g)
	Bi-207	1.2	(pCi/g)
	Bi-210m	8.3	(pCi/g)
	Tc-99	2140	(pCi/g)
	Sr-90	94.72	(pCi/g)

Type I Error	0.05		
$Z_{1\text{-alpha}}$	1.645		
Type II Error	0.2		
$Z_{1\text{-beta}}$	0.842		
Effective	0.68	*(s)*	
Sign p	0.993790		

Calculate the Total Effective (s)

Estimate (N) - Sign Test

DCGL	55.00
LBGR	53.00
Delta	2.00
(s)	0.68
Rel Shift	2.954
(N)	8.00

Area Factor adjusted (N) 377

Sample Grid Spacing

SU Area	1,022	m^2	SU Area	11,006	ft^2
Grid Length	10.5	m	Grid Length	34.5	ft
Grid Height	9.1	m	Grid Height	29.9	ft

PRS Compound **Survey Unit** 3

A33/61

Table 7: Compound Recalculations of N

Sample Standard Deviation (s)	Radionuclide	Cleanup Objective	Units
	Ac-227+D	4.6	(pCi/g)
	Am-241	63	(pCi/g)
	Ce-141	38	(pCi/g)
	Cs-137+D	3.8	(pCi/g)
	Co-60	0.7	(pCi/g)
	Cu-244	92	(pCi/g)
	Pb-210+D	7.4	(pCi/g)
	Np-237+D	10.4	(pCi/g)
	Ni-95	2.5	(pCi/g)
8.697	Pu-238	55	(pCi/g)
	Pu-239/240	62	(pCi/g)
	Pa-231+D	4	(pCi/g)
	Ra-226+D	2.9	(pCi/g)
	Ra-228	2.1	(pCi/g)
	Th-228+D	2.6	(pCi/g)
	Th-230+D	2.8	(pCi/g)
	Th-232+D	2.1	(pCi/g)
	U-233+D	4.8	(pCi/g)
	U-234	106.1	(pCi/g)
	U-234+D	2	(pCi/g)
	U-235	16.11	(pCi/g)
	U-235+D	3.2	(pCi/g)
	U-238	121.2	(pCi/g)
	U-238+D	2.2	(pCi/g)
	Bi-207	1.2	(pCi/g)
	Bi-210m	8.3	(pCi/g)
0.095	Tritium	75	(pCi/g)
	Sr-90	94.72	(pCi/g)

Type I Error	0.05		
$Z_{1\text{-alpha}}$	1.645		
Type II Error	0.2		
$Z_{1\text{-beta}}$	0.842		
Effective	0.16 (s)		
Sign p	0.964070		

Estimate (N) - Sign Test

DCGL	1.00
LBGR	0.70
Delta	0.30
(s)	0.16
Rel Shift	1.897
(N)	9.00

Calculate the Total Effective (s)

Pu-238 Area Factor adjusted (N) 116

Sample Grid Spacing

SU Area	314	m^2	SU Area	3,383	ft^2
Grid Length	5.5	m	Grid Length	18.0	ft
Grid Height	4.8	m	Grid Height	15.6	ft

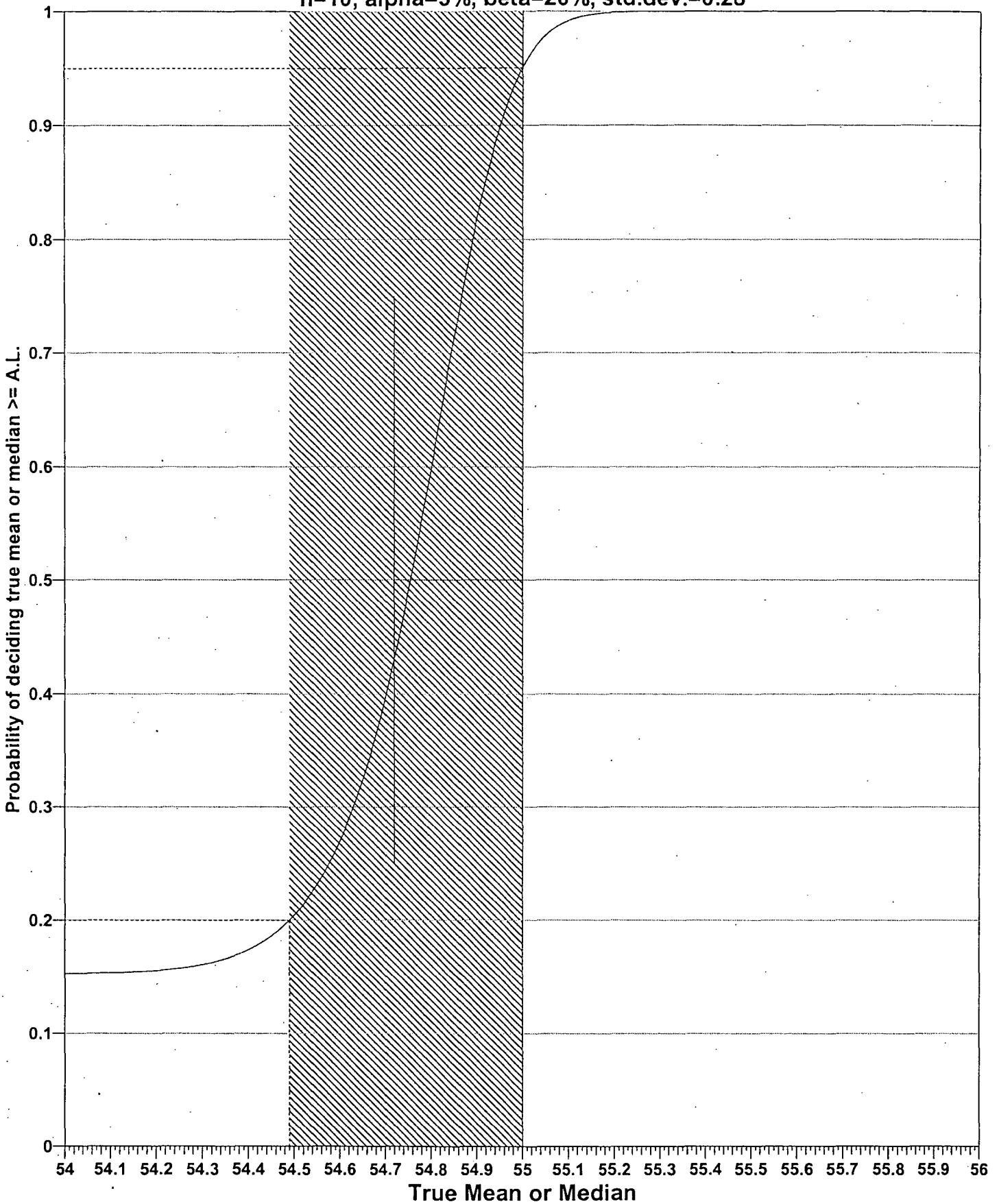
PRS Compound **Survey Unit** 4

A34/61

SU1

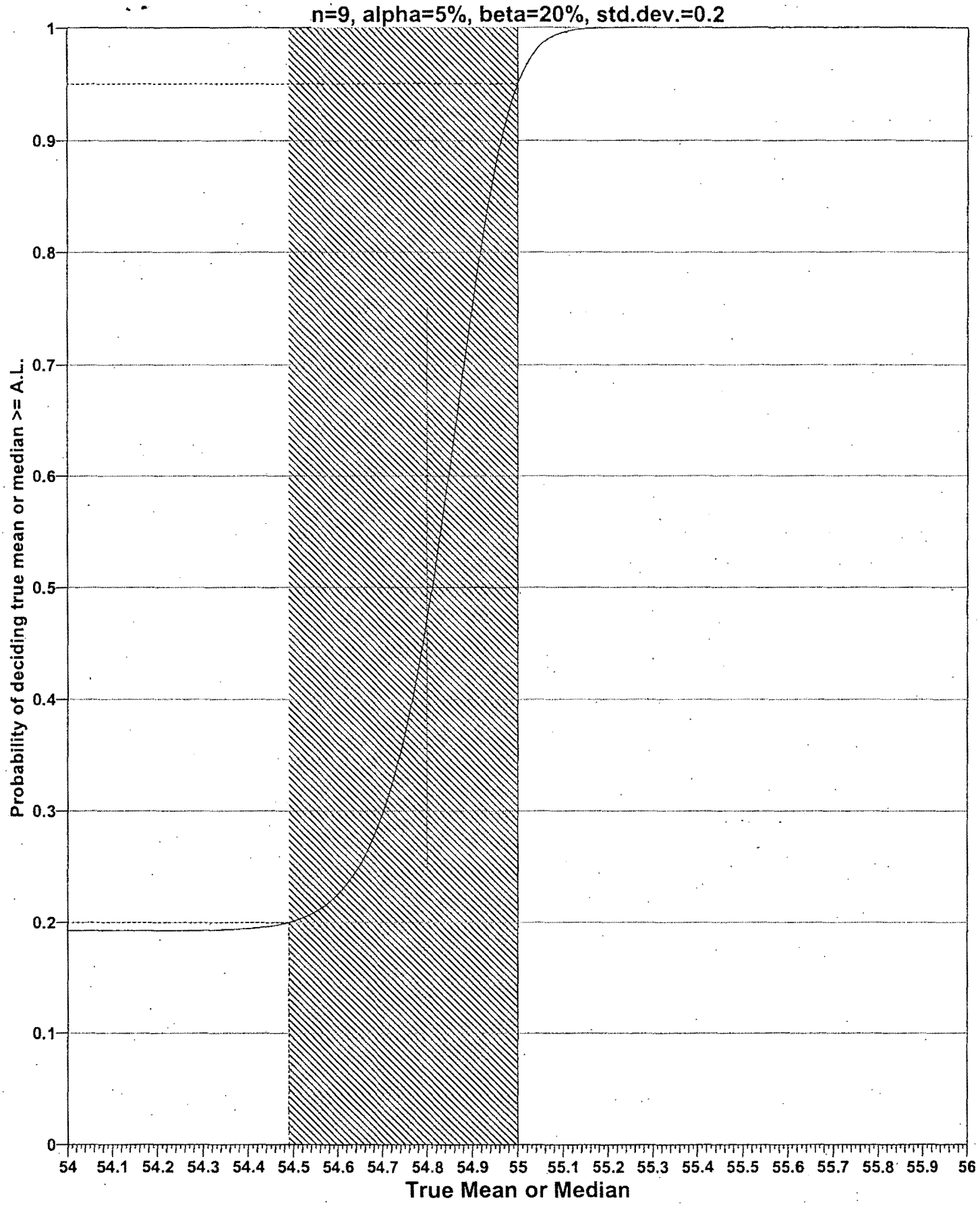
Table 8: Compound Power Curves

n=10, alpha=5%, beta=20%, std.dev.=0.28



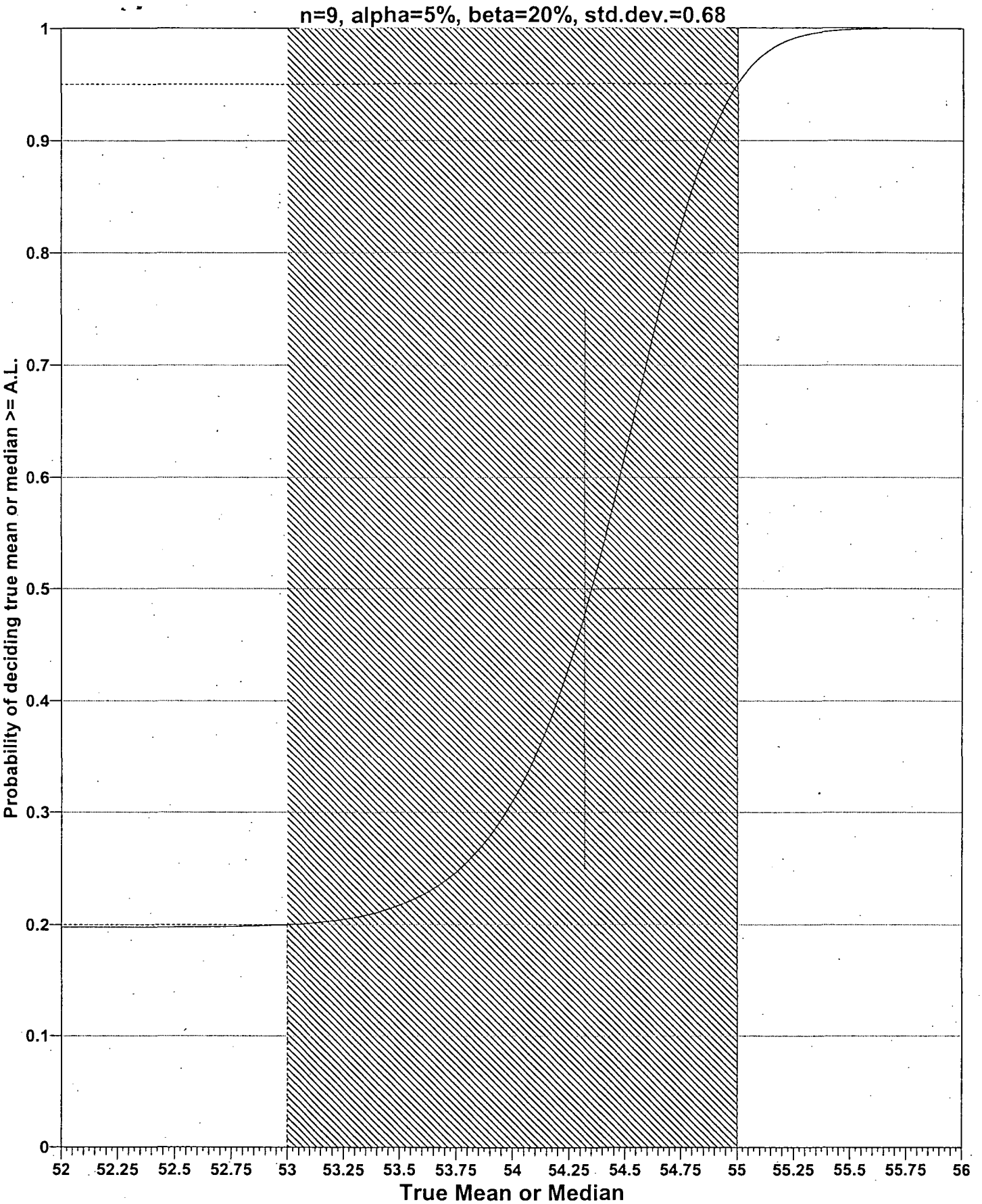
SU2

Table 8: Compound Power Curves



SU 3 3/4

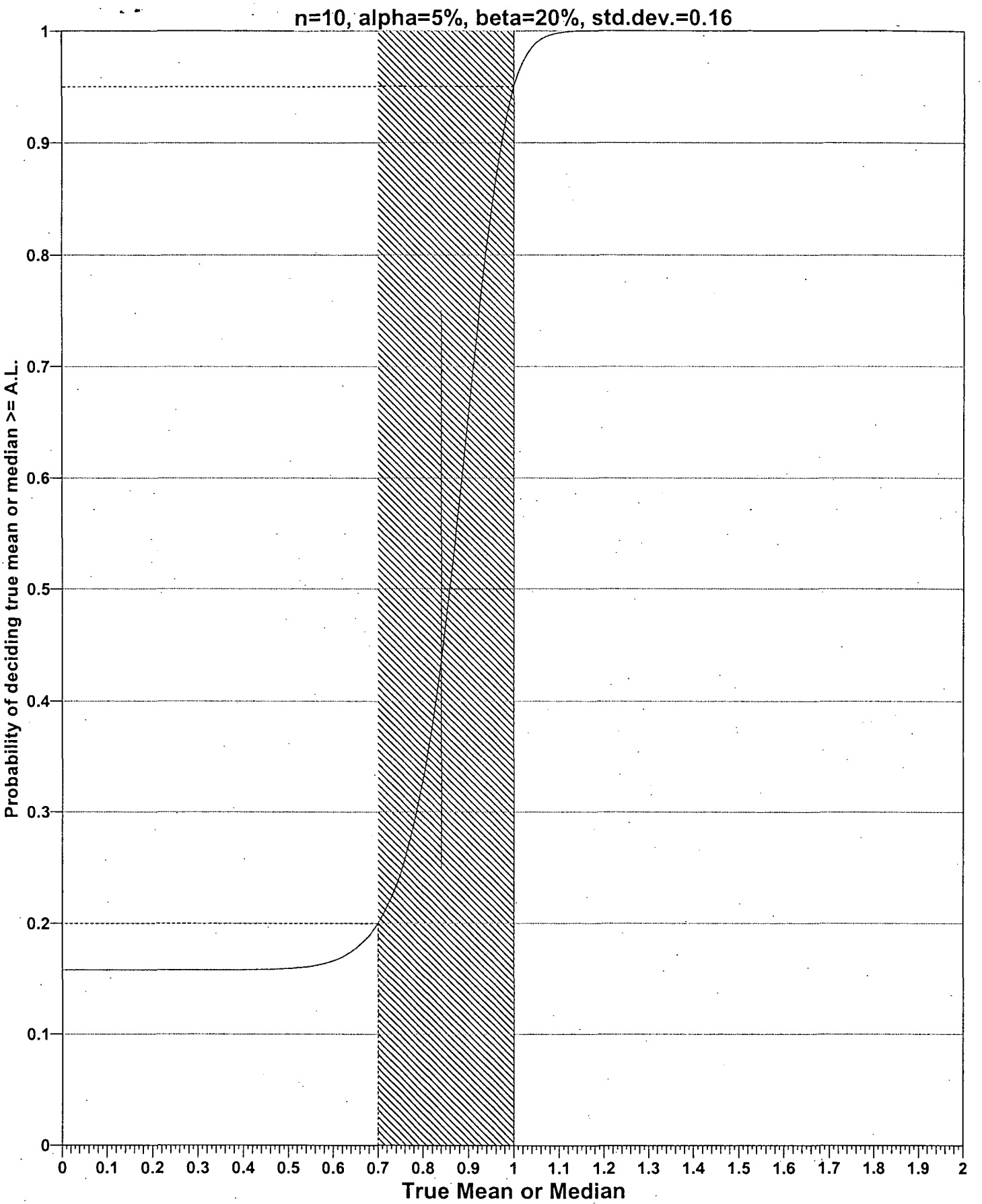
Table 8: Compound Power Curves



A37/61

su4

Table 8: Compound Power Curves



APPENDIX C

POST-EX SUD EXCERPTS

- AGL/OHL Post-Ex SUD (excerpt)
- Compound Post-Ex SUD (excerpt)

Survey Unit Design (SUD)

Project: Above Ground Lines (AGLs) & Overhead Lines (OHLs) Associated with the Underground Lines Removal Project

Review & Approval

Project Engineer: Robert Ransbottom _____

Reviewer: James Fontaine _____

Reviewer: _____

Document	Title
Action Memo	*UGL Action Memorandum, Final, September 2003*
RP	*UGLs Removal Plan, Final, April 2004*
WP	*Underground Lines Removal, ELT-MND-106-00, April 2004*
WP	*BOSS- 36791 Building 48 Demolition*
WP	*BOSS- 38861 Demolition of SW Building*
WP	*BOSS- 38562 Demolition of R Building*
VSAP	*Standard Verification Sampling & Analysis Plan, Final, August 2004*

☐ **Pre-Excavation** or ☒ **Post-Excavation**?

Summary of Changes (for Post-Excavation SUDs ONLY) (see following pages for details)	YES	NO	COMMENT
1. Did the COC(s) change?		X	
2. Did the grid size or N change?	X		See Item 6a
3. Did the classification change?		X	
4. Were bias/judgmental samples collected?		X	
5. Other significant change?	X		Propose no further sampling

A40/61

SUD Worksheet

Acronyms

AGL	Above Ground Line
AM	Action Memo
BGS	Below Ground Surface
CO	Cleanup Objective
COC	Contaminant of Concern
EPA	Environmental Protection Agency
FSS	Final Status Survey
HS	Hot Spot
MARSSIM	Multi – Agency Radiation Survey and Site Investigation Manual
MDC	Minimum Detectable Concentration
MEIMS	Mound Environmental Information Management System
NA or N/A	Non-applicable
OHL	Overhead Line
PRS	Potential Release Site
QA/QC	Quality Assurance/Quality Control
RA	Remedial Action
RadCon	Radiological Control
RASS	Remedial Action Support Survey
RP	Removal Plan
SD	Sanitary Disposal (SD) Building
R/SW	Research/Special Works (R/SW) Complex
SU	Survey Unit
SUD	Survey Unit Design
TBD	To Be Determined
UGL	Underground Lines
VSAP	Verification Sampling and Analysis Plan
WD	Waste Disposal (WD) Building
WDA	Waste Disposal Annex (WDA) Building
WP	Work Package

Item 1

Summary of historic **information** relevant to SU:

No PRSs are included within this SUD. See attached Figure 1, showing locations of these Above Ground Lines and Overhead Lines.

The Above Ground Lines (AGLs) are two double-walled polyethylene waste transfer lines installed in the 1970s to replace saran-lined steel piping which conveyed radioactive wastes from the R/SW Complex to the WD Facility. One of the two AGLs was a 1½ inch waste line constructed of seamless polyethylene encased in a three-inch outer pipe of the same construction. This line conveyed low risk beta wastewater from the R/SW Complex to WDA where it was collected in one of two beta influent water holding tanks. A two-inch waste line constructed of seamless polyethylene was encased in a four-inch outer pipe of the same construction. This line conveyed alpha wastewater from the R/SW Complex to WD Building. Each of these lines lay on the ground surface (except for an approximate 40-foot section where the lines run through five-inch steel conduits beneath the road southwest of the former Building 48) and are each approximately 375 feet long. No leakage is known to have occurred from these lines, so adjacent soil is expected to be unaffected by their operation.

The Overhead Lines (OHLs) consisted of one two-inch schedule 40 waste line that ran from the south end of the R/SW complex on stanchions in a southerly direction then alongside Building 48 and on to the Building 125 and WD complex. For several years, this line carried similar alpha waste water as was carried in the alpha AGL line. The line was approximately 625 feet long. No leakage is known to have occurred from these lines.

Item 2

Summary of historic **data** relevant to SU:

AGLs: Authorizing Document: UGL Action Memo, Final, September 2003.

OHLs: Authorizing Document: UGL Action Memo, Final, September 2003

A MEIMS query was performed within 15 feet (30-foot width) of the entire length of AGLs and OHLs. Historic surface soil sample results are shown on Figure 2. Historic surface soil data below Cleanup Objectives (COs) (to mimic the as-left conditions) are presented in Table 1 (Attachment B).

RASS samples will be collected and analyzed onsite during fieldwork. Excavation is not required based on the Action Memo; however, excavation may be warranted based on results of RASS results. Where sampling indicates contamination above cleanup objectives, excavation will occur to remove the contamination. COCs will be adjusted as appropriate in the Post-Excavation SUD.

Item 3a

COC	BASIS	(pCi/g) CO	HS	Offsite Analysis & Compendium Method: tritium (A-014)	Sr-90 (A-016)	gamma (A-015)	Iso Pu (A-012)	Iso Th (A-012)	Iso U (A-012)
TBD (to be determined)	Since a removal action is not required, there are no COCs listed in the AM. However, standard deviations for all analytes within the areas queried were forwarded to the spreadsheet to provide some basis for the number of samples (N). Analysis will be determined in the Post-Excavation SUD based on RASS data.	na	na	TBD	TBD	TBD	TBD	TBD	TBD

Analyses will be determined in the Post-Excavation SUD. Surface samples/analysis are to be in accordance with MD-80036 Ops 10001, 10002, 30005, 30007, and 30040. Hard surfaces will be swiped and gross alpha and beta measurements will be performed and compared to the most restrictive COC in Mound 2000 Work Plan Appendix A Table 1 (NUREG 1.86 Regulatory Guide). If the location fails to meet the most restrictive criteria then it will be sent to alpha spec for determination of the COC so the applicable, instead of the most restrictive, criteria can be applied.

Changes if any, from Pre-exc SUD: RASS sampling has no results over the cleanup objectives, including gross beta and tritium analyses. Walkover surveys revealed no readings over background (RSDS 05-ER-702) (& RSDS). See Appendix II. No further sampling required.

Note: gross beta results follow page 6 of 6 of this SUD. 20 Feb 06

A42/19

Item 3b	Chem basis for std dev, AM COCs/New COCs NA

Item 4

Classify Areas & provide justification:

This SUD consists of one Class 3 survey unit. Class 3 is justified because this survey unit has a low probability of residual contamination, but insufficient information to justify a non-impacted classification. Also this survey unit is not a PRS, no record of line breaks was found, and a soil RA is not required per the UGL AM. Sampling is being conducted to confirm that removal of the lines did not impact the surface soil below.

Selection	Class	Scan Coverage guidelines
	1	100%
	2	10-90%
X	3	Judgmental

Changes if any, from Pre-exc SUD: RASS sampling has no results over the cleanup objectives, including gross beta and tritium analyses. Walkover surveys revealed no readings over background (RSDS 05-ER-702). See Appendix II. No further sampling required.

Item 5

Subdivide areas into SUs

See Attachment A for Figures

See Attachment B for Historical Sample Data < CO

See Attachment C for MARSSIMS Survey Unit Spreadsheet

This SUD consists of one SU composed of two small sub-areas (SU1a and SU1b, see Attachment A):

SU1a is a six-foot wide path from the starting point of the AGLs across the road from the southwest corner of SW Building down to the northern face of the former WD building. It is approximately 375 feet in length. (375'x6'=2250 square feet (sf))

SU1b is a three-foot wide path below the length of the OHLs which ran from the southern end of the R/SW complex south to the northern edge of Building 23. The OHLs were approximately 625 feet in length. (625x3=1875 sf)

Note: The AGLs laid on the ground approximately three feet apart, resulting in the six foot wide affected area versus the three foot path for the OHLs.

Therefore SU1a (2,250 sf) + SU1b (1,875 sf) = **4,125 sf total**

Changes if any, from Pre-exc SUD: The sample area was reduced because many parts overlapped PRSs, which were remediated and verified separately. This SUD only includes areas that did not overlap other remediated and verified PRSs. RASS sampling for this SUD was conducted on one Survey Unit of 1,748 sq. ft. There were no sample results over the cleanup objectives, including gross beta and tritium analyses. Walkover surveys revealed no readings over background (RSDS 05-ER-702). See Appendix II. No further sampling required.

A43/61

Item 6a	Calculations / Rad 1. Calculate the (s) for each COC listed above: See Attachment C. 2. Number of Samples (N): See Attachment C. Spreadsheet-Calculated Numbers of Samples: SU1 = 16 SU1 Scanning MDC (Area Factor) corrected = na, Class 3 A total of 16 sample locations will be assessed.
	Changes if any, from Pre-exc SUD: 16 judgmental RASS samples had no results over the cleanup objectives. Walkover surveys revealed no readings over background (RSDS 05-ER-702).. See Appendix II. No further sampling required.
Item 6b	Calculations/Chem, Std dev, Number of Samples N/a
	Changes if any, from Pre-exc SUD: N/a
Item 7	Grid spacing All samples are judgmental. Therefore, N was divided evenly over the areas involved, resulting in the spacing shown on Attachment A.
	Changes if any, from Pre-exc SUD: RASS sampling has no results over the cleanup objectives, including gross beta and tritium analyses. Walkover surveys revealed no readings over background (RSDS 05-ER-702). See Appendix II. No further sampling required.
Item 8	**QA/QC:** Collection of QA/QC samples shall be in accordance with the Standard VSAP, Final, August 2004. Q-002 Chain-of-Custody Procedures Q-003 Documentation Requirements Q-004 Laboratory Data Reduction Q-006 Validation of Laboratory Data Packages Q-007 Data Assessment Q-008 Data Integrity Verification Q-010 Electronic Data Deliverable Format Specifications – MEIMS Std. … S-001 General Instructions for Field Personnel S-002 Soil Sampling With a Spade and Scoop S-028 Sample Control and Documentation S-029 Guide to Handling, Packaging, and Shipping of Samples and Method Q-002
Item 9	Bias/judgement samples Judgmental samples are planned as shown on Attachment A. Biased samples are not planned. (Additional bias samples are always within the discretion of the EPA.)
	Changes if any, from Pre-exc SUD: No bias samples will be collected. Judgmental samples were taken as shown on Figure 1 of Appendix II.

19/hh/4

Item 10	Not otherwise covered.../ comments No excavation is anticipated; however, potentially impacted work area atop an excavation, where excavated materials will be loaded into haulers, and are not hard surfaces (i.e., soil) will be considered for inclusion in the Post-excavation SUD, as appropriate. Potentially impacted work area atop the excavation, where excavated materials will be loaded into haulers, and are hard surfaces (i.e., concrete and asphalt) will be surveyed and released, per RadCon procedures (MD-80036) in accordance with DOE Order 5400.5 and Mound 2000 Work Plan Appendix A Table 1. A separate survey unit will be added in the post-excavation SUD for those loading areas not on asphalt/concrete. Site policy requires performance of onsite soil screening (NaI or germanium) on verification samples slated for offsite analysis and evaluation of the results prior to shipment. This analysis will generally be performed on a split of the verification sample containerized in an EPA dish (approximately 500 mL) but may be performed on the actual verification sample as long as containerization requirements are maintained for the offsite lab. Count time of the analysis will be sufficient to meet the cleanup objectives (COs) of the contaminants of concern (COCs) requiring verification. In-process sampling events (Characterization and Remedial Action Support Survey (RASS) samples) will be conducted. Those samples will undergo gamma spectrometry analysis to guide actions. Gross beta analysis will be accomplished on 10% of the samples. A walkover survey will be conducted over the entire length of the AGLs and OHLs, excluding those areas previously excavated and remediated. RASS sampling and process knowledge of the remediated areas will be used to determine when the FSS (verification) sampling could be conducted. These samples undergo gamma spectroscopy analysis and, where historical Th230, U233/U234, or U238 locations are above cleanup objectives, samples will be taken and analyzed via alpha spectroscopy.
	Changes if any, from Pre-exc SUD: All RASS samples were analyzed by onsite long count gamma to determine COCs for the Final Status Survey. There were no results greater than CO. Walkover surveys revealed no readings over background (RSDS 05-ER-702). Offsite gross beta and onsite tritium analysis were done on 10% of the samples. See Appendix II.

A45/61

Group 9 AGL/OHL RASS Data
Offsite
Gross Beta

Sample ID	Soil Analysis Report Sample #	SUD Sample #		MDA
			(pCi/g)	
SL			94.72	
	SU1A-06	SU1a-06	29.4	5
	SU1B-06 DUP		29.7	4.9
	SU1B-07	SU1b-07	35.1	4.8

MDA - Minimum Detectable Activity
pCi/g - picoCuries/gram
SL - Screening Level Sr-90 CO= 94.72

A46/61

RADIOLOGICAL SURVEY DATA SHEET

LOCATION: (BLDG./AREA/ROOM) SU1 + SU2 (AGL/OHL)	SURVEY NO. 05 ER 702
PURPOSE: SOIL SAMPLES (REMEDIAL ACTION SUPPORT SURVEY)	RWP NO. N/A
	DATE: 11 07 05
	TIME: 1530

MAP/DRAWING

COPY

See page #2 for sample locations map.

Soil samples obtained: SU1a-05; SU1a-06; SU1b-07; SU1b-08; SU1b-09; SU1b-10; SU2a-01; SU2a-02; SU2a-03; SU2b-04; SU2c-11; SU2c-12; SU2c-13; SU2c-14; SU2c-15; SU2c-16.

LEGEND: # = mrem/hr (γ) whole body
#E = mrem/hr (β+η+γ) extremity on contact

△ =SOIL SAMPLE LOCATION

= air sample number

(#) = swipe number

(#/α) or/β = direct cont. measurement in dpm/100cm²

11/15/05

INSTRUMENTS USED

Instrument	Serial Number	Cal. Due Date
~~PER~~ FIDLER	4115/4123	012606

N A

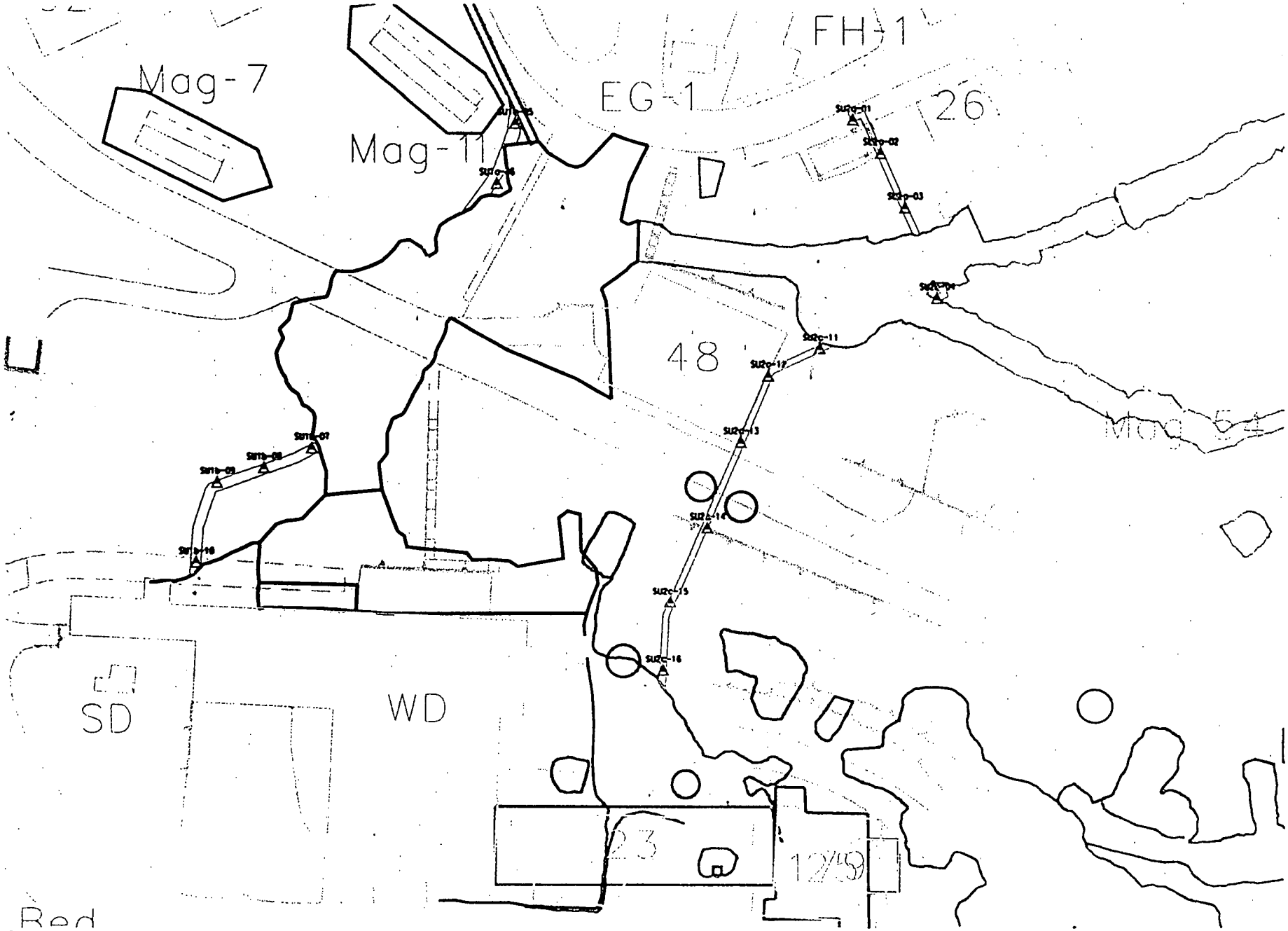
[redacted]

HP #	DATE:
~~4992~~ 4992	11/14-05
HP #	DATE:
5416	DATE: 11-15-05

[redacted]

ML-9620 (2-98)

A460761



FIDLER READINGS INDICATED BKG. LEVELS
AT ALL SAMPLE LOCATIONS (CHANNELS 1 + OUT)

Aug 6/91

05 ER 702

2 of 18

Survey Unit Design (SUD)

Project: Group 9 Subcontractor Compound – Former I Building Site

Review & Approval

Project Engineer: R.C. Ransbottom R.C. Ransbottom

Reviewer: James Fontaine CKline for J. Fontaine

Reviewer: _____

Document	Title
Action Memo	*UGL Action Memorandum, Final, September 2003*
RP	*UGLs Removal Plan, Final, April 2004*
WP	*Soil Removal, ELT-MND-105-00, April 2004*
WP	*Underground Lines Removal, ELT-MND-106-00, April 2004*
VSAP	*Standard Verification Sampling & Analysis Plan, Final, August 2004*

☐ **Pre-Excavation** or ☒ **Post-Excavation**? **Date:** 01-10-05

Summary of Changes (for Post-Excavation SUDs ONLY) (see following pages for details)	YES	NO
1. Did the COC(s) change?		X
2. Did the grid size or N change?		X
3. Did the classification change?		X
4. Were bias/judgmental samples collected?		X
5. Other significant change?		X

4/7/61

SUD Worksheet

Acronyms

AM	Action Memo
BGS	Below Ground Surface
COs	Cleanup Objectives
COCs	Contaminants of Concern
ELT	Earthline Technologies (Subcontractor for the UGL project)
FIDLER	Field Instrument for Detection of Low Energy Radiation
FT	Feet
FT/M	Feet per Minute
FSS	Final Status Survey
H	H Building (Environmental Labs)
HW	Hot Waste
M^2	Square Meters
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
mCi	milli (10^{-3}) curies
MDC	Minimum Detectable Concentration
mL	Milliliter
MND	Mound
N	Number of Samples
NaI	Sodium Iodide
nCi/g	nano (10^{-9}) curies per gram
pCi/g	pico (10^{-12})curies per gram
QA/QC	Quality Assurance/Quality Control
Pu	Plutonium
PRS	Potential Release Site
R	R Building (Research)
RASS	Remedial Action Support Survey
RBGV	Risk-Based Guideline Value
SQ FT	Square Feet
Std Dev	Standard Deviation
SU	Survey Unit
SUD	Survey Unit Design
SW	SW Building (Special Works)
TBD	To Be Determined
UGL	Underground Lines
VCP	Vitreous Clay Pipe
VSAP	Verification Sampling and Analysis Plan
WD	WD Building (Waste Disposal)
WDA	WDA Building (Waste Disposal Annex)
WP	Work Package

Item 1	Summary of historic **information** relevant to SU: The Removal Plan associated with the Group 9 Underground Lines and Soil Removal Project required the subcontractor to house personnel and equipment in a construction-type compound at the location of the former I Building. The site is on the west edge of the Main Hill at Mound and west of the former SW Building, and was bounded by a temporary fence enclosing four trailers and one storage building. (See Site Plans, Figures 1, 2, and 3)
Item 2	Summary of historic **data** relevant to SU: No historical contaminants of concern are associated with this area. However, a SUD has been prepared for this area to confirm that no contamination remains from the project. A contamination incident (Pu238) did occur within the Group 9 project at PRS 438 in July 2004. Contamination was inadvertently spread to the subcontractor compound via workers' shoes and vehicle tires. This low-level contamination was quickly cleaned up. The intent of this SUD is to verify that no residual contamination above cleanup objectives remains. In addition, during this project, an occasional stream of water contaminated with tritium flowed through the compound when misting operations were conducted during the R/SW Buildings demolition. Since minimal sample data is available in the compound area, the nearby PRS 426 Final Status Survey Data was used to simulate the "as-left" condition (See Table 1.) A FIDLER with a G-5 probe will be used to scan the three survey units.

Item 3a

COC	BASIS	(pCi/g) CO	(pCi/g) HS	Offsite Analysis & Compendium Method: tritium (A-014)	Sr-90 (A-016)	gamma (A-015)	Iso Pu (A-012)	Iso Th (A-012)	Iso U (A-012)
Pu238	Contaminant found in compound.	55	165.13				X		
Tritium	Contaminant found in compound (SU-4 Only)	75	n/a	X					

Changes if any, from Pre-ex SUD: none

Item 3b	Chem basis for std dev, AM COCs/New COCs	none

A49/61

Item 4	Classify Areas & provide justification:	Selection	Class	Scan Coverage guidelines
	SU1 is Class 1 based on the contamination incident and subsequent soil cleanup. The roadway leading to the compound is not in the SU, but since it is asphalt, it will be released per radcon procedure MD-80036.	X	1	100%
	SU2 and SU3 are Class 3 because they are inactive areas with no known contamination. A fence separates SU1 from SU3. The boundary between SU1 and SU2 is arbitrary, but represents high traffic (SU1) versus minimal traffic (pedestrian and vehicle). Reference Figure 3 for the Group 9 Compound Survey Units drawing.		2	10-90%
		X	3	Judgmental (Visual Sampling Plan [VSP] generated random samples.)
	Changes if any, from Pre-ex SUD: SU4 was added and is Class 1 due to sampling showing presence of tritium.			

Item 5	Subdivide areas into SUs	This SUD consists of three Survey Units (see Figure 3): SU1 is the active compound area traversed by pedestrians and vehicles; SU2 and SU3 are inactive areas north and south of the main compound. Samples shown in SU1 are laid out in a 15' grid. SU2 and SU3 have randomly-generated sample locations. The eight random samples in both SUs 2 and 3 were selected using the random generation feature of the Visual Sampling Plan software.
	Changes if any, from Pre-ex SUD: SU4 was added. Samples are laid out on a 15' grid.	

A50/61

Item 6a	Calculations / Rad 1. Calculate the (s) for each COC listed above: See Attachment C. 2. Number of Samples (N): See Attachment C. Spreadsheet-Calculated Numbers of Samples: SU1 = 8; SU2 = 8; SU3 = 8, SU4 = 8. SU1 Scanning MDC (Area Factor) corrected = 606 samples. SU2 Scanning MDC (Area Factor) corrected = 704 samples SU3 Scanning MDC (Area Factor) corrected = 377 samples. SU4 Scanning MDC (Area Factor) corrected = 116 samples SU1 default 15 foot triangular grid = 52 samples SU2 random samples = 8 samples, plus 3 EPA Biased samples SU3 random samples = 8 samples SU4 default 15 foot triangular grid = 10 samples The determination of the number of samples for SU1 & 4 is consistent with section 3.7 of the standard VSAP, which provides for default grid spacing. Sample locations were selected by overlaying onto the SU1 & SU4 a 15-foot triangular or linear plan with a random starting point. A total of 81 sample locations to be assessed.
	Changes if any, from Pre-exc SUD: none
Item 6b	Calculations/Chem, Std dev, Number of Samples none
	Changes if any, from Pre-ex SUD: none

451/61

Item 7	Grid spacing	15 foot grid for SU1. Samples within SUs 2 and 3 are random. The MARSSIM spreadsheet computes the required number of samples (N) – in this case, coincidentally 8 for each SU.
	Changes if any, from Pre-ex SUD: 15 foot grid for SU4	
Item 8	**QA/QC:** Collection of QA/QC samples shall be in accordance with the Standard VSAP, *Final, August 2004.* Q-002 Chain-of-Custody Procedures Q-003 Documentation Requirements Q-004 Laboratory Data Reduction Q-006 Validation of Laboratory Data Packages Q-007 Data Assessment Q-008 Data Integrity Verification Q-010 Electronic Data Deliverable Format Specifications – MEIMS Std. … S-001 General Instructions for Field Personnel S-002 Soil Sampling With a Spade and Scoop S-028 Sample Control and Documentation S-029 Guide to Handling, Packaging, and Shipping of Samples and Method Q-002	
Item 9	Bias/judgement samples	Three bias samples are proposed by CH2M Hill along the path of the small stream that flowed through the compound. These samples will be analyzed for tritium. (Additional bias samples are always within the discretion of the EPA.) Three bias samples have been requested by the US EPA and are shown in Figure 3 within Survey Unit 2. Tritium to be analyzed by Compendium method A-014. The 10^{-6} RBGV is 7580 pCi/g.
	Changes if any, from Pre-ex SUD: With the addition of SU4, three bias samples along the small stream have been removed.	
Item 10	Not otherwise covered…/ comments Site policy requires performance of onsite soil screening (NaI or germanium) on verification samples slated for offsite analysis and evaluation of the results prior to shipment. This analysis will generally be performed on a split of the verification sample containerized in an EPA dish (approximately 500 mL) but may be performed on the actual verification sample as long as containerization requirements are maintained for the offsite lab. Count time of the analysis will be sufficient to meet the cleanup objectives (COs) of the contaminants of concern (COCs) requiring verification. The results of the long count gamma will be used to provide the support needed to ensure no other contaminants had been inadvertently tracked into this area. If a contaminant is found above the cleanup objective then the standard removal and bounding of this contaminant will take place. The long count gamma spec data from this SUD will be provided in the data report. 100% FIDLER walkover surveys (FIDLER with a G-5 probe) will be conducted to detect hot spots for the areas included within and adjacent to the SUs included in this SUD. If contaminants are found greater than CO, they will be added as new COCs.	

A54/61

APPENDIX D

BACKFILL PACKAGES

- AGL/OHL (none required as no excavation was performed)
- Compound (none required as no excavation was performed)

APPENDIX E

DATA REVIEW & VALIDATION

- AGL/OHL (R&V not required)
- Compound R&V (included herein)

DATA REVIEW & VALIDATION REPORT
for COMPOUND

DOE – Mound
Subcontractor Compound
Miamisburg, Ohio

Prepared for:
Terran Corporation
Project Manager: Chris Ruef

Prepared by:
Waste Science, Inc.
1411 Fallswood Drive
Potomac, MD 20854
Point of Contact: Katy Makeig
301-340-3301
www.wastescience.com

December 30, 2005

THIS REPORT INCLUDES:

Subcontractor Compound Samples
from Laboratory Analytical Batches

F5K180199
F5K180202
F5K180204
F5K180216
F5K180220

A 55/61

1.0 Introduction

Analytical data can be evaluated on at least three quality control levels:

Data Review involves an assessment of the quality controls used by the laboratory during the performance of the analysis. These include such things as laboratory blanks, system monitoring compound (surrogate) recoveries, matrix spikes, etc. Which controls are assessed and what criteria are applied depend on the analysis performed. The results of field quality control measures such as field duplicates and trip blanks may also be evaluated. Data Review is normally performed on 100% of the analytical data.

Data Validation is a more detailed review of the entire laboratory data package. It includes all the elements of the Data Review plus verification of such checks as proper instrument calibration, proper use of standards and correct performance of data calculations. Data Validation is used to identify systemic problems with the way the laboratory performs and reports analyses.

Data Assessment may also evaluate whether project data quality objectives and other program needs that led to the collection of samples in the first place were met. Data assessment typically draws on the results of data validation of one or more data sets.

2.0 Description of the Data Set

This data assessment covers 89 samples collected November 7-10, 2005, from the Mound facility (Subcontractor Compound) to confirm environmental compliance prior to site closure. Offsite sample analyses were performed at Severn-Trent Laboratories of Earth City (St. Louis), MO, as analytical batch – lab sample delivery group (LSDG) F5K180199, F5K180202, F5K180204, F5K180216 and F5K180220. Samples included 81 solid samples, four field duplicates, four aqueous (rinsate) samples, and four samples designated as matrix spike (MS) samples for analytical quality control (QC) purposes.

There were no problems associated with the documentation, shipment, or chain of custody of the samples. Analyte detection goals were achieved, except for one sample where poor chemical yield (66%) led to an elevation of detection limits. Table 1 summarizes the identification of the samples and the analyses performed (next page); the analytical methods performed were:

- Alpha spectroscopy for isotopic plutonium (Pu) by DOE Environmental Monitoring Lab (EML) Method A-01-R, Modified.
- Liquid Scintillation Counting for Tritium (H-3) by EML H3-04-RC, Modified.

3.0 Data Review

The quality control data submitted with the analytical data packages were reviewed and assessed. The results of the assessment are presented in this section. The following qualification flags (Table 2) are used to indicate data quality problems identified during the data review process.

A56/61

Table 1
Sampling Information

Field Sample ID	Laboratory ID	Alpha Spectrometry (Plutonium Analysis)	Scintillation Counting (Tritium Analysis)	QC Check?
000437	F5K180199-001			
000438	F5K180199-002			
000439	F5K180199-003			
000440	F5K180199-004			MS / MSD
000441	F5K180199-005			
000442	F5K180199-006			
000443	F5K180199-007			
000444	F5K180199-008			
000445	F5K180199-009			
000446	F5K180199-010			
000447	F5K180199-011			
000448	F5K180199-012			
000449	F5K180199-013			
000450	F5K180199-014			
000451	F5K180199-015			
000452	F5K180199-016			
000453	F5K180199-017			
000454	F5K180199-018			
000455	F5K180199-019			
000456	F5K180199-020			
000457	F5K180202-001			
000458	F5K180202-002			
000459	F5K180202-003			
000460	F5K180202-004			MS / MSD
000461	F5K180202-005			
000462	F5K180202-006			
000463	F5K180202-007			
000464	F5K180202-008			
000465	F5K180202-009			
000466	F5K180202-010			
000467	F5K180202-011			
000468	F5K180202-012			
000469	F5K180202-013			
000470	F5K180202-014			
000471	F5K180202-015			
000472	F5K180202-016			
000473	F5K180202-017			
000474	F5K180202-018			
000475	F5K180202-019			
000476	F5K180202-020			

KEY:
MS/MSD = The sample was also analyzed spiked for QC purposes.
FDup XXX = The sample is a field duplicate of sample number XXX
= Analysis not performed for that sample.
= Sample is an aqueous (rinsate) sample.

(Table continues next page)

Table 1, Concluded
Sampling Information

Field Sample ID	Laboratory ID	Alpha Spectrometry (Plutonium Analysis)	Scintillation Counting (Tritium Analysis)	QC Check?
000477	F5K180204-001			
000478	F5K180204-002			
000479	F5K180204-003			
000480	F5K180204-004			MS / MSD
000481	F5K180204-005			
000482	F5K180204-006			
000483	F5K180204-007			
000484	F5K180204-008			
000485	F5K180204-009			
000486	F5K180204-010			
000487	F5K180204-011			
000488	F5K180204-012			
000489	F5K180204-013			
000490	F5K180204-014			
000491	F5K180204-015			
000492	F5K180204-016			
000493	F5K180204-017			
000494	F5K180204-018			
000495	F5K180204-019			
000496	F5K180204-020			
000497	F5K180216-001			
000498	F5K180216-002			
000499	F5K180216-003			
000500	F5K180216-004			
000501	F5K180216-005			
000502	F5K180216-006			
000503	F5K180216-007			
000504	F5K180216-008			
000505	F5K180216-009			
000506	F5K180216-010			
000507	F5K180216-011			
000508	F5K180216-012			MS / MSD
000509	F5K180216-013			
000510	F5K180216-014			
000511	F5K180216-015			
000512	F5K180216-016			
000513	F5K180216-017			
000514	F5K180216-018			
000515	F5K180216-019			
000516	F5K180216-020			
000517	F5K180220-001			
000518	F5K180220-002			FDup of 000506
000519	F5K180220-003			FDup of 000508
000520	F5K180220-004			FDup of 000479
000521	F5K180220-005			FDup of 000504
000522	F5K180220-006			Rinsate for 000467
000523	F5K180220-007			Rinsate for 000512
000524	F5K180220-008			Rinsate for 000464
000525	F5K180220-009			Rinsate for 000437

KEY:

MS/MSD	= The sample was also analyzed spiked for QC purposes.
FDup of XXXXXX	= The sample is a field duplicate of sample number XXXXXX
	= Analysis not performed for that sample.
	= Sample is an aqueous (rinsate) sample.

A 58/61

Table 2 - Data Review Qualifications

Flag	Description
J	Estimated sample result
U	Non-detect sample result
UJ	Non-detected sample result at an estimated reporting limit
R	Rejected (unusable) sample result – (NOT required for these data)

3.1 Tracer Recovery

The laboratory spikes every alpha spectrometry sample with a non-target isotope as appropriate. The percent recovery of this isotope is then used to scale the detected presence of the target isotopes. To fully meet QC criteria the isotope recovery must be between 30% and 110% and have an accumulated count of at least 200 counts. Tracer recovery for all samples met QC criteria, with recoveries of 78-104% for solid samples and 66-92% for aqueous rinsates.

3.2 Blanks

The laboratory analyzes one blank for every 20 samples or LSDG. Laboratory blanks are analyzed to determine if laboratory processes are contributing to the detected sample activities. Laboratory blanks were analyzed at an appropriate frequency.

The laboratory method blanks associated with the verification samples were consistently free of contamination by target isotopes.

3.3 Laboratory Duplicate

A laboratory duplicate analysis is performed to assess the precision and accuracy of the laboratory analysis. At least one duplicate is performed for every 20 samples or LSDG. The laboratory analyzed MS/MSD samples in order to achieve this frequency; no data were qualified for these occurrences.

To meet QC criteria the relative error ratio (RER) of duplicate samples must be < 3.0, or if one or both results are nondetect.

$$RER = \frac{[\text{Sample Result} - \text{Duplicate Result}]}{[TPU^2_{sample} + TPU^2_{dup}]^{1/2}}$$

TPU: total propagated uncertainty

It is known that for Mound soils contamination is usually distributed non-homogeneously even in dried and ground samples. Divergent results obtained from analysis of second portions from the same sample, if found, are a demonstration of this fact and not of the laboratory capability for precision. Agreement was considered acceptable if both results were nondetect, or if one was nondetect and the other found at an estimated trace level. The relative error ratio for the laboratory duplicate analyses was within QC criteria in all cases for this sampling event.

A 59/61

3.4 Matrix Spike

A matrix spike (MS) analysis is performed to assess the precision and accuracy of the laboratory analysis. One matrix spike is to be performed for every 20 samples of a given matrix or at least once per LSDG. This frequency was met except for the lone field sample in LSDG F5K180220, for which no MS/MSD was performed. No data were qualified for this occurrence, as all other MS/MSD and LCS data were consistently acceptable.

For all analytes/samples spiked, the matrix spike recoveries were within QC criteria for the target analytes and no data qualification was required.

3.5 Laboratory Control Sample

The Laboratory Control Sample (LCS) is a standard sample with a known quantity of the analyte of concern. The LCS recovery is an indication of whether the analytical process was in control during the analysis. The LCS recoveries were consistently within QC requirements, demonstrating good analytical accuracy, and were analyzed at an acceptable frequency.

3.6 Equipment Rinsates

Equipment rinsates are used to ensure efficacy of equipment field decontamination procedures, and that the sample collection process is not causing cross contamination. All of therinsates were free of measurable contamination.

For this sampling event, four aqueous (rinse) samples were collected for 81 field samples collected (i.e. excluding field duplicate QC samples). This frequency meets the 5% frequency required for this project, within rounding limits.

3.7 Field Duplicates

Field duplicates give an indication of the degree of homogeneity within the sample material. As with laboratory duplicates, they are reported as RER. Agreement between field duplicates was acceptable for all analyte pairs. Four field duplicate samples were reported for this sampling event. This frequency meets the 5% frequency required for this project, within rounding limits.

As noted under laboratory duplicates, it is known that for Mound soils contamination is usually distributed non-homogeneously even in dried and ground samples. If divergent results are obtained from analysis of field duplicate pairs from the same sampling location, such an outlier would be a demonstration of this fact. Agreement was considered acceptable if both results were nondetect, or if one was nondetect and the other found at an estimated trace level. The relative error ratio for the field duplicate analyses was within QC criteria in all cases for this sampling event.

3.8 Other Issues

Consistent with standard laboratory practice, detected results that were found below the required reporting limit were qualified as estimated by the laboratory. These results have inherently poor precision, as they are close to the analytical detection limit. The qualifiers were retained during data validation, and pose no significant limitation to data usability.

In one case, for Plutonium-239/40 in sample F5K180204-017, a positive result was reported with an uncertainty greater than the result. This value was qualified as estimated, as this implies a less than 95% confidence in the detection. Nondetect results where the uncertainty was greater than the absolute value of the result were present, and were qualified "UJ" (nondetect at an estimated reporting limit), as the sample count may be less than the background reading in such cases. These instances did not result in data rejection; the results may be used as estimated values.

4.0 Data Validation

The results of 10% of samples in each LSDG were fully data validated. In addition to the items discussed above, the following items were evaluated:

1. Instrument calibration
2. Daily Source checks
3. Background and efficiency measurement
4. Proper frequency and use of blanks
5. All calculations

No additional qualification resulted from this assessment. There was no indication of a systemic deficiency.

5.0 Certification

Based upon this review the analytical data maybe used as presented with no further qualifications. No data required rejection; 100% completeness for all analyses was obtained.

A61/61

ATTACHMENT B

GENERAL MEDIA INFORMATION

(There was no information released to the media regarding AGL/OHL or Compound)